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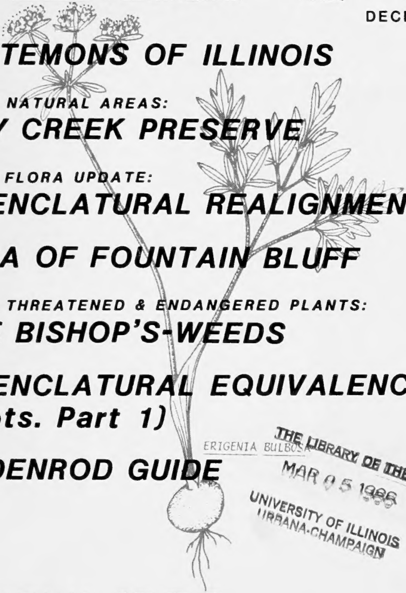

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ILLINOIS NATIVE PLANT SOCIETY

ERIGENIA (ISSN 8755-2000)

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ERIGENIA

JOURNAL OF THE
ILLINOIS NATIVE PLANT SOCIETY

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Dept. of Botany
Southern Illinois University

THE HARBINGER

Quarterly Newsletter of the Society

Editor: Dr. Robert Mohlenbrock
Dept. of Botany
Southern Illinois University

The Illinois Native Plant Society is dedicated to the preservation, conservation and study of the native plants and vegetation of Illinois.

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TO CONTRIBUTE: See inside back cover for guidelines.

NUMBER 6 DECEMBER 1985

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EDITORIAL

by Mark W. Mohlenbrock

A mere four years ago a group of 12 people, mostly graduate students of Dr. Robert Mohlenbrock, sat in his lab one evening and formed the Southern Illinois Native Plant Society. This small group, which at first was affiliated with the Missouri Native Plant Society, was very active and inovative from the start. Within six months after its founding, the Society established a quarterly newsletter, The Harbinger, and this journal, Erigenia. As I read through the manuscripts for this issue and several others for future issues I couldn't help but reflect how much progress has occurred within the Society since the founding days.

Membership in the Society has steadily increased so as to be more than ten times that of the founding group. The Society has become active in conservation issues such as the Pine Hills Road project and the current River-to-River Road controversy. The Society Book Service now offers hundreds of titles to both members and non-members. The articles appearing in Erigenia offer insight to Illinois botany for both the technical and general audiences. The journal is fast becoming a publication which an Illinois botany or general plant enthusiast can ill afford to pass by.

By far the most exciting advancement to occur in the eyes of your Editor was the reorganization of the Society this past year to form the Illinois Native Plant Society. This move will surely aid in native plant conservation and awareness throughout the state. With the foundation described above, the Illinois Native Plant Society can look toward a bright future with an increasing voice and visibility in conservation issues, advances in Illinois botany, and a greater public awareness of our beloved native flora.

President's Message:

To Society Members:

It is my pleasure to address you as out-going President of the Society. As most of you already know, we have expanded our organization into a statewide Illinois Native Plant Society (INPS). What was formerly known as the Southern Illinois Native Plant Society is now the Southern Chapter of the INPS and the groundwork is being laid for the formation of several other chapters throughout the state. Financial and technical support will be afforded by the Society to facilitate the successful formation of those chapters and we encourage your involvement and/or leadership toward that goal wherever possible.

The Society has also expanded its role in various statewide conservation efforts. For example, we continue to provide a major voice in reviewing the Shawnee National Forest management plan which will determine the management of the Forest for the next 50 years. Another current concern is a proposed river-to-river road through southern Illinois. At present, both the forest plan and the road allow for an unacceptable amount of environmental degradation and we are focusing our efforts so that these unfortunate situations may be rectified.

It is my hope that the Society will continue to expand its membership via new chapters as well as expand its voice on conservation issues that threaten the integrity of natural communities and endangered species.

Sincerely,

Ann Phillippi

Ann Phillippi, Ph.D.
Department of Zoology
Southern Illinois Universtiy
Carbondale, Illinois 62901
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THE GENUS Penstemon (Scrophulariaceae) IN ILLINOIS

Robert H. Mohlenbrock[1] and Lawrence R. Stritch[2]

Penstemon is a genus of Scrophulariaceae with about 300 species, all but two of which occur in the United States. A single species is known from eastern Asia, and another is found in central America.

While the biggest percentage of species is in the western United States, more than a dozen occur in the northeastern region of the country. Of the twelve taxa known from Illinois, only ten are apparently native.

When Samuel B. Mead published the first list of Illinois plants in 1846, he recorded three Penstemons. His P. laevigatus is the same as P. digitalis, his P. pubescens is P. hirsutus, and his P. gracilis is P. pallidus.

Although Pepoon attributed P. albidus Nutt. to Illinois (near Joliet) in 1927, there are apparently no specimens to substantiate this report. Penstemon deamii Pennell, recorded in Illinois from Pope, Union, and Wabash counties, may be a good species, but we are excluding it from this treatment because of our inability to distinguish it from other taxa.

Penstemon Mitchell - Beardstongue

Perennials (in Illinois) with erect stems; leaves of two types, the basal ones petiolate and in a rosette, the cauline ones sessile to clasping and alternate; stipules absent or obscure; inflorescence paniculate or racemose, terminal, several-flowered;

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[1]Dr. Robert H. Mohlenbrock is Distinguished Professor of Botany at Southern Illinois University, Carbondale.

[2]Dr. Lawrence R. Stritch is a Natural Heritage Biologist with the Illinois Department of Conservation, with his home office in Pittsfield.

calyx green, united below, 5-lobed above; corolla tubular, 2-lipped, the upper lip 2-lobed and usually smaller than the 3-lobed lower lip; fertile stamens 4, mostly included in the corolla, with two of the filaments longer than the other two; sterile stamen bearded or nearly glabrous; style one, elongate, with a capitate stigma; capsule mostly conical, many-seeded.

Key to the Taxa of Penstemon in Illinois

1. Upper and bracteal leaves clasping; corolla greater than 3.2 cm long------------------------------------9. P. grandiflorus

1. All leaves sessile to petiolate; corolla less than 3.2 cm long (except in P. cobaea)-------------------------------2

2. Corolla more than 3.2 cm long----------------6. P. cobaea

2. Corolla less than 3.2 cm long---------------------------3

3. Corolla glandular-pubescent within--------12. P. tubaeflorus

3. Corolla eglandular within-------------------------------4

4. Anterior lobes of the corolla equalling or narrowly exceeding the posterior lobe; sterile filament slightly to moderately bearded------------------------------------5

4. Anterior lobes of the corolla far exceeding the posterior lobe; sterile filament densely bearded------------------7

5. Anthers bearded with short, stiff hairs; corolla white or slightly tinged or lined with purple----------------------6

5. Anthers glabrous; corolla more or less purple---4. P. calycosus

6. Corolla 23-30 mm long; stem glabrous, shiny and slightly glaucous; sepals scarious-margined--------7. P. digitalis

6. Corolla 16-23 mm long; stem dull, finely pubescent to glabrous; sepals not scarious-margined---1. P. alluviorum

7. Stems pubescent with glandular hairs; anterior lobes of the corolla arching upward to the posterior lobe-10. P. hirsutus

7. Stems pubescent with eglandular hairs; anterior lobes of the corolla not arching upward-----------------------------------8

8. Cauline leaves ovate-lanceolate to ovate--5. P. canescens

8. Cauline leaves linear-lanceolate to oblanceolate--------9

9. Sepals from half to nearly equalling the length of the capsule---8. P. gracilis

9. Sepals less than half the length of the capsule-----------10

10. Corolla lined with deeper color, the anterior lobes of the corolla projecting beyond the posterior lobe------11

10. Corolla unlined, its anterior lip upcurved against the posterior so that the orifice to the throat is closed--10. P. hirsutus

11. Leaves pubescent, the throat of the corolla much longer than the tube--12

11. Leaves glabrous or nearly so, the throat of the corolla equalling the length of the tube or scarcely longer---2. P. arkansanus

12. Corolla white, lined with purple; sterile filament moderately bearded--------------------------11. P. pallidus

12. Corolla purplish; sterile filament strongly bearded---3. P. brevisepalus

1. *Penstemon alluviorum* Pennell in Small, Man. S.E. Flora 1203. 1933.

Penstemon laevigatus Sol. ssp. alluviorum (Pennell) Bennett, Phylologia 9:57. 1963.

Stems erect, 3-10 dm tall, green to purplish, finely puberulent to glabrous; cauline leaves petiolate to clasping, 7-18 cm long, 1.5-2.5 cm wide, lanceolate, sharply serrate, the lower surface paler than the upper, finely pubescent to glabrous; inflorescence generally less than one-third the height of the plant, longer than wide, finely pubescent; calyx 3-5 mm long at anthe-

sis, slightly glandular-pubescent; corolla 15-23 mm long, white or pale purple, lined with purple within, glandular-pubescent externally, finely pubescent internally, the anterior lip projecting outward, the orifice to the throat open.

Common Name: Bottomland Beardstongue.

Habitat: Swampy woods.

Range: Indiana to Illinois, south to Mississippi and Arkansas.

Illinois Distribution: Confined to the extreme southern counties of Illinois.

There is some question as to the distinctiveness of this species from P. digitalis. The main differences lie in the shorter sepals during anthesis of P. alluvlorum and the smaller capsules. The swampy woods habitat seems to be consistent for P. alluviorum.

The flowers bloom from May to June.

2. *Penstemon arkansanus* Pennell, Proc. Acad. Nat. Sci. Phila. 73:494. 1922.

Penstemon pallidus Small ssp. arkansanus (Pennell) Bennett, Phytologia 9:57. 1963.

Stems erect, 5-10 dm tall, green to greenish red. puberulent to glabrate; leaves lanceolate to oblanceolate, puberulent to glabrate, 4-7 cm long, 1-2 cm wide, entire to slightly serrate; inflorescence one-third the height of the plant, glandular-pubescent, longer than wide; calyx 2.5-4.7 mm long at anthesis, glandular-pubescent; corolla 15-20 mm long, white externally, lined with fine violet-purple lines internally, pubescent externally, the anterior lip equalling or barely exceeding the posterior lip, the orifice to the throat open.

Common Name: Ozark Beardstongue.

Habitat: Dry, rocky woods and wooded slopes.

Range: Illinois to Missouri, south to Texas and Arkansas.

Illinois Distribution: Known only from Jackson and Randolph coun-

This species differs from the very similar P. pallidus by its nearly glabrous leaves and by the throat of the corolla about as long as the tube.

It flowers from April to June.

3. *Penstemon brevisepalus* Pennell in Small, Man. S.E. Fl. 1204. 1933.

Stems erect, 3-8 dm tall, green to somewhat purplish, finely pubescent; basal leaves broadly elliptic, 6-8 cm long, 1.5-2.5 cm broad, with the petiole 3-4 cm long; cauline leaves lanceolate to oblanceolate, sharply serrate, 7-10 cm long, to 1.5 cm wide, thinly pubescent on both sides, opposite, sessile to nearly clasping; inflorescence one-third the height of the plant, longer than wide, glandular-pubescent; calyx 1.5-3.0 mm long at anthesis, finely glandular-pubescent; corolla 1.5-1.9 cm long, pale lavender outside, internally paler with dark purple lines, finely glandular-pubescent externally, the anterior lip projecting outward, the orifice to the throat open.

Common Name: Short-sepaled Beardstongue.

Habitat: Dry, usually rocky, woods.

Range: Virginia and West Virginia south to Georgia and Tennessee; southern Illinois.

Illinois Distribution: Known only from Pope and Union counties.

Although the senior author at one time suggested that Penstemon brevisepalus intergraded with P. pallidus and should not be recognized as a distinct species, several collections from extreme southern Illinois have convinced him that P. brevisepalus is distinguishable from P. pallidus. The flowers are consistently purple in this species.

Penstemon brevisepalus flowers in May and June.

4. *Penstemon calycosus* Small, Bull. Torrey Club 25:470. 1898.

Penstemon laevigatus Sol. ssp. calycosus (Small) Bennett, Phytologia 9:57. 1963.

Stems erect, 5-12 dm tall, glabrous to hirsutulous, green to purplish; cauline leaves variable in shape and length from lanceolate to oblanceolate, 7-12 cm long, to 3 cm broad, sessile-clasping to long-petiolate, moderately serrate, the lower leaf surface somewhat paler than the upper, glabrous to finely pubescent; inflorescence less than one-third the height of the plant, longer than wide, glandular-pubescent; calyx 5-11 mm long at anthesis, glandular-pubescent; corolla 20-33 mm long, externally pale purple to violet-purple, generally paler to the anterior side, internally almost white to slightly purplish, glandular-pubescent externally, slightly pubescent internally, the anterior lip equal to or slightly exceeding the posterior lip, the orifice to the throat open.

Common Name: Smooth Beardstongue.

Habitat: Wooded slopes, edge of woods.

Range: Maine to Michigan south to Missouri and Alabama.

Illinois Distribution: Throughout the state, except for the northwestern counties.

The general lack of pubescence on this species, particularly on the anthers, sets P. calycosus well apart from other species in the genus in Illinois.

The flowers bloom from May to July.

5. *Penstemon canescens* Britt. f. *brittonorum* (Pennell) Fern. Rhodora 51:84. 1949.

Stems erect, closely cinereous-pubescent to glabrate, 2.5-8.0 dm tall, greenish purple at the base to green above; basal leaves linear-lanceolate, glabrous to glabrate, 3-6 cm long, 1.2-2.3 cm wide, petiolate; cauline leaves sessile, ovate to broadly oblong-lanceolate, broadly rounded to cordate at the base, 4.5-8.2 cm long, 2.7-5.2 cm broad, glabrous; inflorescence greater than one-third the height of the plant, pubescent, with strictly ascending branches; calyx 3.2-5.5 mm long at anthesis, pubescent; corolla 20-28 mm long, externally pale purple, internally nearly white with lines of purple, strongly ridged within, the anterior lip projecting considerably beyond the posterior lip, the orifice to the throat open; capsule 6-8 mm long.

Common Name: Ashy Beardstongue.

Habitat: Woods.

Range: Pennsylvania to Illinois, south to Alabama and South Carolina.

Illinois Distribution: Known only from Franklin County.

Forma brittonorum differs from typical P. canescens by its glabrous cauline leaves. The broadly ovate leaves distinguish this taxon from the somewhat similar P. pallidus and P. brevisepalus.

The flowers bloom from mid-May through June.

6. *Penstemon cobaea* Nutt. Trans. Amer. Phil. Soc. II, 5:182. 1837.

Stems erect, pubescent, 4.0-7.5 dm tall, green to greenish purple; leaves oblong to narrowly ovate, 5-20 cm long, 2.5-6.0 cm broad, pubescent, strongly serrate, petiolate to sessile and nearly clasping; inflorescence less than one-third the height of the plant, pubescent, longer than wide; calyx 8-11 mm long at anthesis, glandular-pubescent; corolla 35-50 mm long, nearly as broad, white or pale violet-purple, lined with purple within, the throat and the lobes glandular-pubescent internally, pubescent externally, the anterior lip slightly exceeding the posterior lip, the throat abruptly expanding, strongly inflated, narrowing to the open orifice; capsule 9-12 mm long.

Common Name: Large Beardstongue.

Habitat: Flat, dry meadow (in Illinois).

Range: Arkansas to Nebraska, south to Texas; adventive in Illinois.

Illinois Distribution: Known only from Kane County: near Kendall city line, June 25, 1972, J. Philips, D. Young, & R. Schulenberg s.n. (MORT).

Except for P. grandiflorus, this species has the largest flowers of any Penstemon in Illinois. It blooms from mid-May to late June.

7. *Penstemon digitalis* Nutt. ex Sims, Bot. Mag. 52, pl. 2587. 1825.

Penstemon laevigatus Sol. var. digitalis (Nutt.) Gray, Syn. Fl. 1:268. 1878.
Penstemon laevigatus Sol. ssp. digitalis (Nutt.) Bennett, Phytologia 9:57. 1963.

Stems erect, 7-15 dm tall, glabrous, somewhat glaucous, green to purplish; leaves lanceolate to oblanceolate to oblong-ovate, 5-12 cm long, 1.5-3.0 cm broad, moderately serrate, paler on the lower surface, glabrous, petiolate to sessile; inflorescence less than one-third the height of the plant, slightly pubescent, longer than wide; calyx 5-8 mm long at anthesis, glandular-pubescent; corolla 23-30 mm long, white or purplish tinged externally, white internally, glandular-pubescent externally, the anterior lip slightly exceeding the posterior lip, the orifice to the throat open.

Common Name: Foxglove Beardstongue.

Habitat: Woods, thickets, prairies, and fields.

Range: Maine to South Dakota, south to Texas and Virginia.

Illinois Distribution: Throughout the state.

When Mead (1846) and Lapham (1857) first found this species in Illinois, they erroneously called it P. laevigatus. Brendel (1887) and others after him called this plant P. laevigatus var. digitalis. It differs from P. laevigatus by its completely glabrous anthers.

This species flowers from May to July.

8. *Penstemon gracilis* Nutt. var. *wisconsinensis* (Pennell) Fassett, Sp. Fl. Wisc. 144. 1938.

Stems erect, greenish gray, puberulent and often glandular, to 6 dm tall. Leaves obovate to linear-lanceolate, acute at the apex, rounded or tapering to the base, to 8 cm long, to 1.2 cm wide, grayish green and puberulent on both surfaces, sparsely serrate. Inflorescence less than 1/3 the height of the plant, glandular-puberulent; calyx 4-6 mm long at anthesis, glandular-

puberulent, at least half as long as the capsule; corolla 20-24 mm long, pale violet-blue and glandular-puberulent externally, paler and puberulent internally, the anterior lip equalling or barely exceeding the posterior lip, the orifice to the throat open; sterile filament densely bearded. Capsule 5-7 mm long.

Habitat: In cinders (in Illinois).

Range: This variety of P. gracilis is known only from central Wisconsin to northern Illinois.

Illinois Distribution: Kane Co.: Aurora, cattle yards, July 9, 1978, D. Young s.n. (MORT).

The only Illinois record is probably an adventive plant.

The sepals, which are at least half as long as the capsules, distinguish this plant.

This variety flowers during June and July.

9. *Penstemon grandiflorus* Nutt. in Fraser's Cat. 2. 1815.

Stems erect, greenish gray, glabrous, glaucous, to 12 dm tall. Leaves obovate to oblong-lanceolate, obtuse to subacute at the apex, rounded at the base, to 8 cm long, to 3.9 cm wide, glabrous and glaucous on both surfaces, entire or nearly so, the uppermost leaves sessile and clasping. Inflorescence less than 1/3 the height of the plant, glabrous; calyx 8-13 mm long at anthesis, glabrous; corolla 4-5 cm long, pale blue-violet and glabrous externally, paler and marked with deep reddish purple lines and glabrous internally, the orifice to the throat open. Capsule 18-25 mm long.

Habitat: Sandy soil.

Range: Wisconsin and western Illinois to Wyoming, south to Texas and western Missouri.

Illinois Distribution: Apparently native in Henderson, Whiteside, and Winnebago counties; also adventive in McHenry County.

This is the largest flowered species of Penstemon in Illinois.

This species flowers during May and June.

10. *Penstemon hirsutus* (L.) Willd. Sp. Pl. 3:227. 1801.

Chelone hirsuta L. Sp. Pl. 6:1. 1753.

Stems erect, green to gray-green, pubescent, to 75 cm tall. Leaves lanceolate to ovate, acute at the apex, tapering to the base, to 11 cm long, to 2.5 cm wide, dark green and glabrous to pubescent on the upper surface, paler and usually pubescent on the lower surface, serrate. Inflorescence less than 1/3 the height of the plant, glandular-pubescent; calyx 2.5-6.0 mm long at anthesis, pubescent; corolla 15-25 mm long, violet-purple to light violet and glandular-pubescent externally, paler and puberulent internally; sterile filament densely bearded. Capsule 8-9 mm long.

Habitat: Gravelly prairies, wooded slopes.

Range: Quebec to Ontario, south to Illinois and Virginia.

Illinois Distribution: Occasional throughout the state.

During the nineteenth century, this species was generally known as P. pubescens Ait., but Linnaeus' Chelone hirsuta is the same species and clearly predates Aiton's epithet.

The corolla of this species is somewhat similar to that of P. brevisepalus, but differs by being unlined.

This species flowers during June and July.

11. *Penstemon pallidus* Small, Fl. S.E.U.S. 160. 1903.

Stems erect, green to grayish green, pubescent, to 10 dm tall. Leaves narrowly lanceolate to lance-oblong, acute at the apex, tapering or more or less rounded at the base, to 8 cm long, to 2 cm wide, light green and pubescent on both surfaces, serrate to nearly entire. Inflorescence about 1/3 the height of the plant, glandular-puberulent; calyx 3.5-5.0 mm long at anthesis, pubescent; corolla 17-22 mm long, white and glandular-puberulent externally, lined with purple, strongly ridged and puberulent internally, the anterior lip projecting beyond the posterior

lip, the orifice to the throat open; sterile filament densely bearded.

Habitat: Dry woods, prairies, fields.

Range: New York to Michigan, south to Kansas and Georgia.

Illinois Distribution: Common in the southern half of the state, occasional in the northern half.

The small white corolla lined with purple and the gray-puberulent leaves and stems readily distinguish this species.

Mead (1846) and Lapham (1857) reported this species from Illinois as P. gracilis, but this is not the P. gracilis that Nuttall described in 1818.

This species flowers from late April to early July.

12. *Penstemon tubaeflorus* Nutt. Trans. Phil. Soc. II. 5:181. 1837.

Stems erect, green, glabrous, to nearly 1 m tall. Leaves elliptic to elliptic-lanceolate to oblong, acute to obtuse at the apex, rounded at the base, to 10 (-12) cm long, to 4 (-5) cm broad, green and glabrous on both surfaces, entire. Inflorescence slender, up to 1/4 the height of the plant, glabrous or sparsely glandular-pubescent; calyx 3.0-4.5 mm long at anthesis, glabrous or sparsely glandular-pubescent; corolla 20-25 mm long, white, finely glandular-pubescent internally at the throat. Capsule 6-10 mm long.

Habitat: Prairies and dry woods.

Range: Indiana to Wisconsin and Nebraska, south to Texas and Mississippi.

Illinois Distribution: Not common in the southern one-half of the state, rare in the northern one-half.

This entirely white-flowered species of Penstemon is the only member of its genus in Illinois whose corolla has a glandular-pubescent throat.

The flower blooms from mid May to mid June.

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PEPOON, H. S. 1927. An annotated flora of the Chicago area. Bulletin of the Chicago Academy of Science 8:1-554.

NOTICE TO FUTURE CONTRIBUTORS

There is a constant need for manuscripts pertaining to Illinois native plants, natural areas, horticulture, etc. of both technical and general interest. Guidelines for manuscripts submitted may be found on the inside back cover of this issue. Feature articles may be of any number of topics. We will publish floristics studies of areas in Illinois or the states contiguous to Illinois. If you have an idea for an article but would like to have it approved prior to completion, please feel free to discuss it with the Editor (see inside back cover for address).

ILLINOIS NATURAL AREAS:

PINEY CREEK NATURE PRESERVE

Robert H. Mohlenbrock[1]

When I was a graduate student in botany at Southern Illinois University during the spring of 1954, I was perusing a copy of Native and Naturalized Trees of Illinois by R. B. Miller and L. R. Tehon, written in 1929. I was fascinated by a statement under the shortleaf pine that read:

> The Shortleaf Pine occurs in two localities in the southern part of the state. The larger stand occupies a tract of about 200 acres on the hills of Union County near Wolf Lake, and the smaller stand grows in a sandstone ravine of Piney Creek, near the town of West Point in Randolph County.

I was aware of the pine stand in the Pine Hills of Union County, which naturalists had been visiting since the latter part of the nineteenth century, but I could find no one who had seen or even heard of the smaller stand along Piney Creek. I was eager to locate Piney Creek and see if the shortleaf pine still occurred after a quarter of a century.

West Point at one time was a tiny village a few miles southwest of Campbell Hill and just across the county line into Randolph County. Since my father's grandparents were the original settlers of Campbell Hill, I quickly involved my father in the project. Despite having spent his boyhood in and around Campbell Hill, he did not recall Piney Creek or any pines that may have grown there. He and I agreed to look for the pine.

On April 24, 1954, my parents and I drove to Campbell Hill and past the abandoned Campbell Hill brick plant at the northern edge of town. The brick plant, whose weathered kilns still stand, was a famous southern Illinois landmark, having supplied fine quality

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[1] Robert H. Mohlenbrock is Distinguished Professor of Botany at Southern Illinois University, Carbondale.

bricks to the area for many years.

Three miles west of the brick plant, the narrow county road to the south leads to Shiloh, a community now reduced to a few buildings but once the home of Shiloh College, the first college in the area dating back to 1840. The two-story brick building of the college, constructed in 1881, still stands as an imposing edifice in the village. For a while, General John A. Logan of Civil War fame was a student at the college.

Fig. 1. Water cascades over the exposed sandstone bedrock of Piney Creek. Photo by Dr. John Voigt.

About two miles beyond Shiloh is the picturesque white-steepled West Point Lutheran Church, with its adjoining cemetery, all that remained of the hamlet of West Point. A local farmer told us that Piney Creek was at the foot of the hill, about 100 yards south of the church, and that if we followed the rocky creek westward for a quarter of a mile, we would come to some scenic cliffs.

We followed the directions and soon observed sandstone cliffs beginning to enclose the creek on either side. With each step westward, we became dwarfed by the ever-higher cliffs. In many places, the creek bottom was a solid sheet of sandstone, marked only by long, deep grooves. Occasionally the creek dropped off into small, clear pools.

We continued to watch the vegetation on either side of the creek, trying to see if the shortleaf pine was still there. The creek made a couple of sharp meanders, and we paused again to scan the slopes on either side. Much to our satisfaction, we spied a 15 foot tall pine about halfway up the north slope. We had rediscovered the shortleaf pine at Piney Creek!

No other pines were in view at this point, so we busied ourselves identifying and listing the common spring wildflowers that were beginning to bloom. The mesic woods lining the creek were filled with trilliums, violets, buttercups, phloxes, wild geraniums, bluebells, and many others. One bright yellow buttercup, unrecognized at sight, was routinely collected and placed in my collecting can for later identification.

After following Piney Creek along a series of sharp switchbacks, we came to a north slope studded with several mature specimens of shortleaf pine. The largest was about 60 feet tall and stood high above a number of small pines, pine seedlings, and bird's-foot violets. Not only was the shortleaf pine still along Piney Creek, it was obviously reproducing adequately.

We encountered the silky willow (Salix sericea) and Carolina buckthorn (Rhamnus carolinianus) along the creek, both woody species found infrequently in southern Illinois. Two sedges grew in extensive colonies in and along the creek. These later proved to be Carex substricta and C. torta, two rare plants for the region.

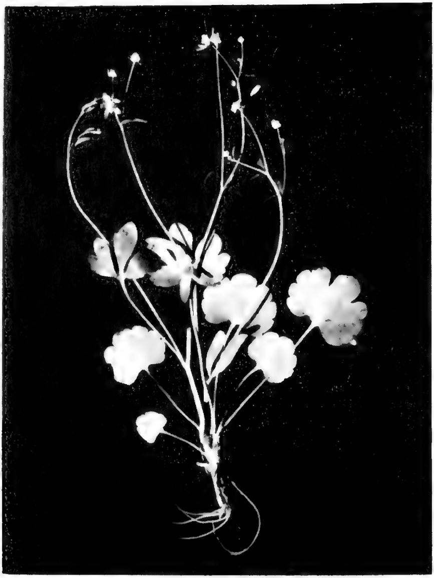

Fig. 2. A specimen of Harvey's Buttercup, Ranunculus harveyi. *Photo by Dr. John Voigt.*

In places, the creek splashed against vertical cliffwalls whose narrow crevices contained an assortment of ferns. Pinnatifid spleenwort (Asplenium pinnatifidum) was particularly common and showed remarkable variation. A few specimens had leaf tissue so reduced that only the rachis was present. This strange form was later reported in the American Fern Journal by Mohlenbrock and Weber (1956). One fern which I was unfamiliar with caught my eye and was quickly sequestered in my collecting can.

A few yards farther west along Piney Creek, the sandstone cliffs began to taper off, and after a short distance, disappeared and were replaced by a flat floodplain woods.

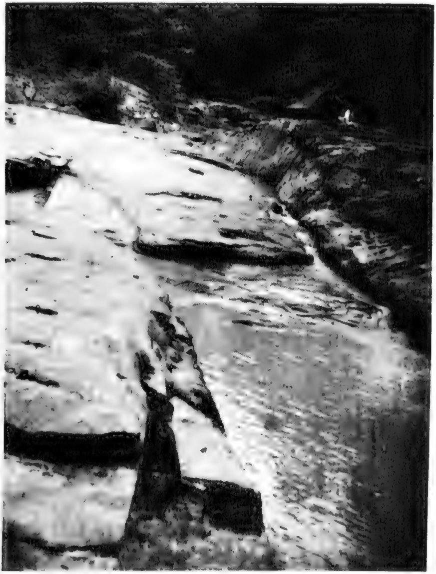

Fig. 3. Carving its way through the sandstone bedrock, Piney Creek calmly flows unaware of the botanical treasures on the nearby slopes. Photo by Dr. John Voigt.

Satisfied with our rediscovery of the shortleaf pine in a beautiful sandstone ravine, we returned to our car and then home where I began to check identifications of the "unknowns." The day's excitement wasn't over. The unrecognized buttercup proved to be Harvey's buttercup (Ranunculus harveyi), while the mysterious fern was identified as Bradley's spleenwort (Asplenium bradleyi). Neither species had ever been found before in Illinois!! Both are characteristic members of the Missouri Ozark flora, as are the shortleaf pine and bird's-foot violet. Piney Creek ravine appears to be an extension of the Missouri Ozarks into southwestern Illinois.

As I am prone to do after I find a rare plant in an area, I return to the site time after time. Frequently I am rewarded with other discoveries. On a subsequent trip to Piney Creek, I found Rubus enslenii, a new blackberry for Illinois.

A thorough botanical survey of this unique area was in order. In 1957, Wallace R. Weber, a graduate student in botany at Southern Illinois University and now Professor of Biology at Southwest Missouri State University and a member of the Illinois Native Plant Society, embarked upon his master's research program at Piney Creek. When the study was completed in 1959, Weber had recorded 441 different kinds of ferns and flowering plants in Piney Creek ravine.

During all of this time, Piney Creek ravine was in private ownership. Fortunately, the landowners were preservation-minded, and were actually proud that they owned property that contained unusual plant species for Illinois. Ultimately, the Illinois Nature Preserves Commission was established and interest swelled in the conservation of natural areas. The Illinois Department of Conservation acquired Piney Creek ravine. Soon after, it was dedicated as an Illinois Nature Preserve and is one of the jewels in this state's fine system of protected areas.

Today, a parking lot along the southwestern corner of the ravine provides easy access by trail into the nature preserve. If you would like a little hike into one of Illinois' most precious areas, make your way to Piney Creek ravine. See you there!

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Robert H. Mohlenbrock
and
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BOOK REVIEW

Growing and Propagating Wild Flowers. Harry R. Phillips. 1985. The University of North Carolina Press. x + 331 pp. (paper back)

When native plant enthusiasts see a new or different wild flower on the side of the road, we want that plant in our garden. Often the attempt to propagate or move the plant ends in failure, leaving not only our yard but the place the plant was all the poorer for its loss. With this book in hand, all that will change as this is one of the best references I have seen on growing and propagating native plants.

Along with 32 color photographs and over 250 illustrations are chapters on flower bed preparation and design; diseases; collecting cleaning and storage of plant seed; dormancy and pregermination techniques and specific cultural requirements for 79 different species of wild flowers and 15 ferns plus comments on related species. The instruction are very explicit and geared for the novice, but the experienced gardener will profit also, especially when attempting plants with exacting dormancy requirements.

The book has a slightly southeastern US slant, which is not suprising considering the place of publication, but it covers many northern US species. A few of the species included are of dubious merit, such as Yarrow, Queen Ann's Lace and Moneywort, but Phillips more than makes up for this by including Butterfly Weed, Turtlehead, Cardinal Flower, Meadow Beauty, Trillium, many prairie plants and a section on carnivorous plants. All-in-all this book should NOT be on your book shelf--it should be with your garden tools, on your cold frame, or in your greenhouse!

ILLINOIS FLORA UPDATE:
NOMENCLATURAL REALIGNMENTS IN THE ILLINOIS FLORA

Robert H. Mohlenbrock[1]

During the preparation of the second edition of the Guide to the Vascular Flora of Illinois, it was necessary to make several new nomenclatural combinations to coincide with the author's concept of the taxa involved. Those new combinations are formalized below.

When Moran (1981) described the hybrid Shawnee Spleenwort from Williamson County, Illinois, he placed it in the genus Asplenosorus, following the reasoning offered by Mickel (1974). It is my opinion that both parents are in the genus Asplenium, rather than in two genera - Asplenium and Camptosorus. Therefore, the following nomenclatural change is necessitated.

Asplenium Xshawneense (R.C. Moran) Mohlenbr., comb. nov.
Basionym: Asplenosorus Xshawneensis R.C. Moran, Am. Fern. Jour. 71:87. 1981.

Species of the large grass genus Panicum can usually be divided into two rather distinct groups which have been recognized by most botanists as subgenera. Hsu (1965) presented significant data that showed the distinct differences between these groups, and Gould (1974) followed this by recognizing each group as a distinct genus, Panicum and Dichanthelium. Since that time, several workers (Clark & Gould, 1975; Brown & Smith, 1975; Gould & Clark, 1978; Freckmann, 1981) have transferred several taxa from Panicum to Dichanthelium.

Several Illinois taxa, most of them reduced to synonymy by one or more of the above workers, appear to be recognizable, based on Illinois material. These are maintained in the Illinois flora, but have never been transferred to Dichanthelium. This paper formalizes those transfers.

[1]Robert H. Mohlenbrock is Distinguished Professor of Botany at Southern Illinois University, Carbondale.

Dichanthelium boscii Gould & Clark var. *molle*(Vasey) Mohlenbr., comb. nov.
Basionym: Panicum latifolium L. var. molle (Vasey) Hitchcock & Chase in Robinson, Rhodora 10:64. 1908.

Dichanthelium commutatum (Schult.) Gould var. *ashei* (Fern.) Mohlenbr., comb. nov.
Basionym: Panicum commutatum Schult. var. ashei Fern. Rhodora 36:83. 1934.

Dichanthelium joori (Vasey) Mohlenbr., comb. nov.
Basionym: Panicum joori Vasey, U.S.D.A. Div. Bot. Bull. 8:31. 1889.

Dichanthelium linearifolium (Scribn.) Gould var. *werneri* (Scribn.) Mohlenbr., comb. nov.
Basionym: Panicum werneri Scribn. in Britt. & Brown, Ill. Fl. 3:501. 1898.

Dichanthelium mattamuskeetense (Ashe) Mohlenbr., comb. nov.
Basionym: Panicum mattamuskeetense Ashe, Journ. Elisha Mitchell Sci. Soc. 15:45. 1898.

Dichanthelium microcarpon (Muhl.) Mohlenbr., comb. nov.
Basionym: Panicum microcarpon Muhl. ex Ell. Bot. S.C. & Ga. 1:127. 1816.

Dichanthelium nitidum (Lam.) Mohlenbr., comb. nov.
Basionym: Panicum nitidum Lam. Tabl. Encycl. 1:172. 1791.

Dichanthelium oligosanthes (Schult.) Gould var. helleri (Nash) Mohlenbr., comb. nov.
Basionym: Panicum oligosanthes Schult. var. helleri (Nash) Fern. Rhodora 36:80. 1934.

Dichanthelium polyanthes (Schult.) Mohlenbr., comb. nov.
Basionym: Panicum polyanthes Schult. Mantissa 2:257. 1824.

Dichanthelium X*scoparioides* (Ashe) Mohlenbr., comb. nov.
Basionym: Panicum scoparioides Ashe, Journ. Elisha Mitchell Sci. Soc. 15:53. 1898.

Dichanthelium villosissimum (Nash) Freckm. var. *pseudopubescens* (Nash) Mohlenbr., comb. nov.

Basionym: Panicum pseudopubescens Nash, Bull. Torrey Club 26:577. 1899.

Dichanthelium yadkinense (Ashe) Mohlenbr., comb. nov.
Basionym: Panicum yadkinense Ashe, Journ. Elisha Mitchell Sci. Soc. 16:85. 1900.

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MICKEL, J. 1974. The status and composition of Asplenosorus. American Fern Journal 64:119.

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A FLORISTICS STUDY OF FOUNTAIN BLUFF, JACKSON COUNTY, ILLINOIS

Robert H. Mohlenbrock[1] and Keith Wilson[2]

Fountain Bluff is a prominent monolith in the broad Mississippi River floodplain immediately southeast of the village of Gorham, Jackson County, in southwestern Illinois. It extends for four miles in a north-south direction and has a maximum width of approximately 1½ miles. Massive sandstone cliffs are exposed in the northern one-third of Fountain Bluff and all along the west side, the tallest rising about 200 feet above the surrounding floodplain. A rim of exposed limestone borders the southwestern corner of the area.

At one point along the southwest face of Fountain Bluff, the Mississippi River comes to within a few hundred yards of the bluff. Most of the precipitous sandstone cliffs are west-facing and provide a habitat for xerophytic species of plants on the exposed rock faces. Extensive mesophytic woods have developed under dense shade along the bases of these west-facing cliffs. Several rivulets descend from the summit of Fountain Bluff, occasionally dropping abruptly into picturesque waterfalls. Elevation of the area varies from about 350 feet near Trestle Hollow to 769 feet at the site of the dismantled lookout tower. Patches of hill prairie dot the top of the limestone escarpment.

Natural springs which emanate from the bluffs account for the common name of Fountain Bluff and were no doubt an incentive to white settlers to colonize the area. The first permanent white settler was Allen Henson, arriving at the bluff in 1808. A pioneer cemetery exists near the north end of the bluff and contains the grave of Benningsen Boone, a relative of Daniel Boone. Several families still live along the eastern side. Except for the private inholdings, the bluff is part of the Shawnee National Forest.

Occasional visits to Fountain Bluff by biologists since 1890 revealed the area to contain many plant species unusual for southern

[1]Robert H. Mohlenbrock is Distinguished Professor of Botany at Southern Illinois University and [2]Keith Wilson resides in Seattle.

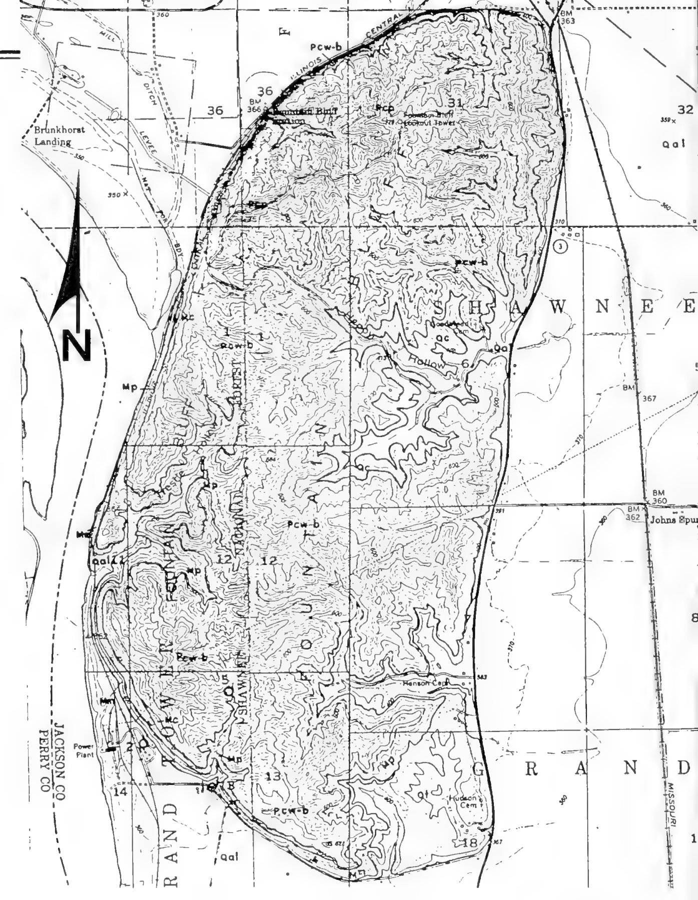

Fig. 1. Map of Fountain Bluff, Jackson County, Illinois.

Illinois. The senior author has been studying the vegetation of Fountain Bluff since 1953. The junior author made an intensive search for plants from 1971 to 1973. This paper is the result of these studies.

Geology

Both Mississippian and Pennsylvanian rocks are exposed on Fountain Bluff. There are three stratigraphic units of the Mississippian exposed--Menard limestone, Palestine sandstone, and the Clore formation. All of these form vertical bluffs on the southwest side of Fountain Bluff. Menard limestone forms a slope 10 to 80 feet high. It is highly fossiliferous with pelecypods, brachiopods, bryozoans, crinoids, and trilobites. A small layer near the center is high in clay and locally forms a calcareous shale.

Palestine sandstone forms a cliff 70 to 80 feet high for 3½ miles on the south and west sides of Fountain Bluff. It is a thin- to medium-bedded sandstone with some shale beds to 6 inches thick. Usually fine grained and sometimes calcareous, this sandstone is conformable with the underlying Menard limestone and the overlying Clore formation.

There are two exposures of the Clore formation on the southwestern and western sides of Fountain Bluff. This formation consists of finely crystalline to very fossiliferous limestone, fine-grained to calcareous sandstone, sandy siltstone, and sandy shale. It has a maximum thickness of 60 feet and is unconformable with basal conglomerate.

Pennsylvanian rocks are made up of Wayside-Battery Rock sandstone and Pounds sandstone in the McCormick group of the Caseyville formation. They are unlike the Mississippian sandstones in that they contain pebbles of quartz and chert.

The Wayside-Battery Rock sandstone members attain a maximum thickness of 135 feet on the southwest side of Fountain Bluff. This coarse conglomerate at the base consists of rounded quartz pebbles, silicified limestone pebbles, and subangular to angular chert fragments. The chert is residual from pre-Pennsylvanian erosion of the Upper Mississippian beds on the upthrown side of the Rattlesnake Ferry Fault. The sandstone is well sorted and medium-grained. Occasional poor cementing results in honeycomb weathering.

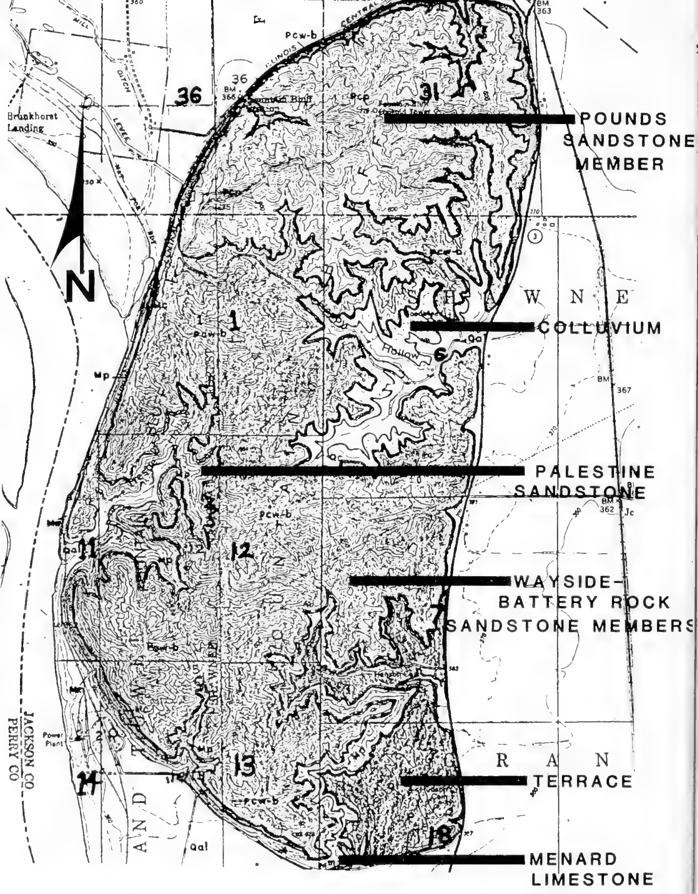

Fig. 2. Map of Fountain Bluff showing major geologic features.

At the northern end of Fountain Bluff, Pounds sandstone forms the upper portion of the vertical cliffs. It is fine- to coarse-grained massive sandstone containing mica. It is cross-bedded and weathers to brown.

Plant Communities

Floodplain Woods. This habitat is limited to a small area at the mouth of Trestle Hollow (T10S, R4W, Section 11) near the Mississippi River. Seasonal flooding of this area by the Mississippi River usually does not exceed the 350-foot contour.

The most common trees of this habitat are cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), sugarberry (*Celtis laevigata*), and sycamore (*Platanus occidentalis*). Other trees are sweet gum (*Liquidambar styraciflua*), cherrybark oak (*Quercus pagoda*), kingnut hickory (*Carya laciniosa*), American elm (*Ulmus americana*), honey locust (*Gleditsia triacanthos*), and Shumard oak (*Quercus shumardii*).

The most common shrub of the understory is swamp holly (*Ilex decidua*). Poison ivy (*Toxicodendron radicans*) and catbrier (*Smilax bona-nox* var. *hederaefolia*) are common woody vines.

Important species of the herbaceous layer are scouring rush (*Equisetum hyemale* var. *affine*), lizard's-tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), snailseed (*Cocculus carolinus*), and aster (*Aster lateriflorus*).

Limestone Woods. A dry south-facing woodland on shallow soil over limestone occurs in the eastern half of Section 13, T10S, R4W. The most common trees are yellow chestnut oak (*Quercus muhlenbergii*) and white ash (*Fraxinus americana*). Also present are Shumard oak (*Quercus shumardii*), red cedar (*Juniperus virginiana*), winged elm (*Ulmus alata*), and black walnut (*Juglans nigra*).

Common shrubs and small trees in the limestone woodland are swamp holly (*Ilex decidua*), rusty nannyberry (*Viburnum rufidulum*), pawpaw (*Asimina triloba*), and Carolina buckthorn (*Rhamnus caroliniana*). Catbrier (*Smilax bona-nox*) is the most conspicuous vine.

Prairie forbs present due to the open nature of the limestone woodlands include hoary puccoon (*Lithospermum canescens*), rosinweed (*Silphium integrifolium*), false boneset (*Brickellia eupatorioides*), and wild hyacinth (*Camassia scilloides*).

Shaded outcroppings of limestone support spring cress (Arabis laevigata), woods fern (Woodsia obtusa), and purple cliffbrake (Pellaea atropurpurea).

Sandstone Cliff Faces. Over 5½ miles of nearly vertical sandstone cliffs varying from 15 to over 100 feet in height define the north, northwest, west, and southwest margins of Fountain Bluff.

The lower cliffs of Palestine sandstone on the southwest side are the driest. Woody plants occupying this habitat include dwarf hackberry (Celtis tenuifolia), winged elm (Ulmus alata), and barberry leaf hawthorn (Crataegus engelmannii). Herbaceous vegetation is sparse and consists primarily of wild petunia (Ruellia humilis), Drummond's goldenrod (Solidago drummondii), ebony spleenwort (Asplenium platyneuron), woods fern (Woodsia obtusa), and several grasses (Panicum lanuginosum var. fasciculatum, P. lineari-folium, and Bromus racemosus).

The west- and northwest-facing cliffs above the Mississippi River are composed of Palestine and Wayside-Battery Rock sandstone. The soil-filled crevices and narrow ledges are occupied by a variety of species typical of the dry ledges, prairies, and woodlands above.

The highest cliffs, on the northwest and north sides of Fountain Bluff, are composed of Wayside-Battery Rock sandstone capped by Pounds sandstone. The numerous small ledges and more mesic rock exposures support the greatest diversity of cliff face vegetation. The moist cliffs extend into the interior of Fountain Bluff along the steep canyon walls of Swimming Hole Hollow and Orchard Hollow. Plants restricted to these cliffs are blue ash (Fraxinus quadrangulata), American barberry (Berberis canadensis), honeysuckle (Lonicera dioica var. glaucescens), columbine (Aquilegia canadensis), pinnatifid spleenwort (Asplenium pinnatifidum), smooth cliffbrake (Pellaea glabella), bellwort (Campanula rotundifolia), and muhly grass (Muhlenbergia racemosa).

Prairies. Small prairie patches have developed atop the limestone bluffs at the south end of Fountain Bluff. Species composition of these prairies include big bluestem (Andropogon gerardii), little bluestem (Schizachyrium scoparium), sideoats grama (Bouteloua curtipendula), Indian grass (Sorghastrum nutans), purple and white prairie clovers (Petalostemum purpureum and P. candidum), false boneset (Brickellia eupatorioides), and blazing stars (Liatris cylindracea and L. scabra).

Mesic Woods. Mesic woods that occur along the base of the west-facing cliffs are among the best for spring wildflowers in southern Illinois. Sessile trillium (*Trillium sessile*) opens the flowering season in mid-March and is followed by an abundance of white trillium (*Trillium flexipes*), celandine poppy (*Stylophorum diphyllum*), blue cohosh (*Caulophyllum thalictroides*), bluebells (*Mertensia virginiana*), wild larkspur (*Delphinium tricorne*), and many others.

Disturbed Habitats. A number of disturbed areas are found along the periphery of Fountain Bluff. Public roads encircle most of the bluffs. A railroad, now abandoned, extends along the entire western side of the bluff. Several homes and abandoned homesites provide additional areas for non-native species.

Taxonomic List

The list of plants that follows is based upon specimens which have been collected within the boundaries of Fountain Bluff. The specimens are deposited in the herbarium of Southern Illinois University (SIU). A total of 991 taxa of vascular plants has been recorded. Most of these are indigenous plants or plants that have been thoroughly naturalized. The few plants on Fountain Bluff which appear to be the direct result of man's plantings are indicated in the list by an asterisk (*). The nomenclature and sequence of taxa follow Mohlenbrock (1975).

EQUISETACEAE

Equisetum arvense L.
Equisetum hyemale L. var. affine (Engelm.) A.A. Eaton

LYCOPODIACEAE

Lycopodium lucidulum Michx.

OPHIOGLOSSACEAE

Botrychium dissectum Spreng. var. dissectum
Botrychium dissectum Spreng. var. obliquum (Muhl.) Clute
Botrychium virginianum (L.) Sw.
Ophioglossum vulgatum L. var. pycnostichum Fern.
Ophioglossum engelmannii Prantl

POLYPODIACEAE

Adiantum pedatum (Tourn.) L.
Pteridium aquilinum (L.) Kuhn var. latiusculum (Desv.) Underw.
Pellaea atropurpurea (L.) Link
Pellaea glabella Mett.
Cheilanthes lanosa (Michx.) D.C. Eaton
Polypodium vulgare L. var. virginianum (L.) Eaton
Polypodium polypodioides (L.) Watt var. michauxianum Weatherby
Polystichum acrostichoides (Michx.) Schott
Onoclea sensibilis L.
Thelypteris hexagonoptera (Michx.) Weatherby
Dryopteris marginalis (L.) Gray
Athyrium pycnocarpon (Spreng.) Tidestrom
Athyrium thelypterioides (Michx.) Desv.
Athyrium felix-femina (L.) Roth var. rubellum Gilb.
Athyrium felix-femina (L.) Roth var. asplenioides (Michx.) Farw.
Asplenium rhizophyllum L.
Asplenium pinnatifidum Nutt.
Asplenium Xebenoides R.R. Scott
Asplenium trichomanes L.
Asplenium platyneuron (L.) Oakes
Woodsia obtusa (Spreng.) Torr.
Cystopteris bulbifera (L.) Bernh.
Cystopteris fragilis (L.) Bernh. var. fragilis
Cystopteris fragilis (L.) Bernh. var. protrusa Weatherby

PINACEAE

Pinus echinata Mill.*
Pinus resinosa Ait.*

CUPRESSACEAE

Juniperus virginiana L.

TYPHACEAE

Typha latifolia L.

ALISMACEAE

Sagittaria calycina Engelm.
Alisma subcordatum Raf.

POACEAE

Bromus tectorum L.
Bromus secalinus L.
Bromus racemosus L.
Bromus commutatus Schrad.
Bromus japonicus Thunb.

Bromus inermis Leyss.
Bromus purgans L.
Bromus pubescens Muhl.
Vulpia octoflora (Walt.) Rydb. var. octoflora
Vulpia octoflora (Walt.) Rydb. var. tenella (Willd.) Fern.
Vulpia octoflora (Walt.) Rydb. var. glauca (Nutt.) Fern.
Festuca ovina L. var. duriuscula (L.) Koch
Festuca pratensis Huds.
Festuca obtusa Bieler
Poa annua L.
Poa chapmaniana Scribn.
Poa pratensis L.
Poa compressa L.
Poa sylvestris Gray
Dactylis glomerata L.
Koeleria macrantha (Ledeb.) Spreng.
Sphenopholis obtusata (Michx.) Scribn. var. obtusata
Sphenopholis obtusata (Michx.) Scribn. var. major (Torr.) Erdman
Sphenopholis nitida (Biehler) Scribn.
Agrostis elliottiana Schult.
Agrostis hyemalis (Walt.) BSP.
Agrostis perennans (Walt.) Tuckerm.
Agrostis alba L.
Cinna arundinacea L.
Phalaris arundinacea L.
Alopecurus carolinianus Walt.
Phleum pratense L.
Elymus hystrix L.
Elymus virginicus L. var. virginicus
Elymus virginicus L. var. submuticus Hook.
Elymus virginicus L. var. glabriflorus (Vasey) Bush
Elymus villosus Muhl. f. villosus
Elymus villosus Muhl. f. arkansanus (Scribn. & Ball) Fern.
Elymus canadensis L.
Hordeum pusillum Nutt.
Agropyron repens (L.) Beauv.
Triticum aestivum L.
Glyceria striata (Lam.) Hitchcock
Brachyelytrum erectum (Schreb.) Beauv.
Diarrhena americana Beauv. var. obovata Gleason
Digitaria sanguinalis (L.) Scop.
Digitaria ischaemum (Schreb.) Muhl.
Paspalum pubiflorum Rupr. var. glabrum (Vasey) Vasey
Paspalum laeve Michx.
Paspalum ciliatifolium Michx.
Paspalum bushii Nash
Panicum dichotomiflorum Michx. var. dichotomiflorum
Panicum dichotomiflorum Michx. var. geniculatum (Muhl.) Fern.
Panicum flexile (Gattinger) Scribn.
Panicum philadelphicum Bernh.
Panicum rigidulum Bosc
Panicum anceps Michx.
Panicum depauperatum Muhl.
Panicum linearifolium Scribn.
Panicum laxiflorum Lam.
Panicum nitidum Lam.
Panicum dichotomum L. var. dichotomum
Panicum dichotomum L. var. barbulatum (Michx.) Wood
Panicum lanuginosum Ell. var. lanuginosum
Panicum lanuginosum Ell. var. implicatum (Scribn.) Fern.
Panicum lanuginosum Ell. var. septentrionale (Fern.) Fern.
Panicum villosissimum Nash
Panicum sphaerocarpon Ell.
Panicum polyanthes Schult.
Panicum malacophyllum Nash
Panicum oligosanthes Schult.

Panicum oligosanthes Schult. var. scribnerianum (Nash) Fern.
Panicum leibergii (Vasey) Scribn.
Panicum commutatum Schult.
Panicum clandestinum L.
Panicum latifolium L.
Panicum boscii Poir.
Echinochloa pungens (Poir.) Rydb. var. microstachya (Wieg.) Mohl.
Echinochloa pungens (Poir.) Rydb. var. wiegandii Fassett
Setaria lutescens (Weigel) Hubb.
Setaria faberi Herrm.
Setaria viridis (L.) Beauv.
Cenchrus longispinus (Hack.) Fern.
Erianthus alopecuroides (L.) Ell.
Sorghum halepense (L.) Pers.
Sorghum bicolor (L.) Moench
Sorghastrum nutans (L.) Nash
Andropogon gerardii Vitman
Andropogon virginicus L.
Schizachyrium scoparium (Michx.) Nash
Zea mays L.*
Eragrostis hypnoides (Lam.) BSP.
Eragrostis cilianensis (All.) Mosher
Eragrostis poaeoides Beauv.
Eragrostis spectabilis (Pursh) Steud.
Eragrostis pectinacea (Michx.) Nees
Eragrostis capillaris (L.) Nees
Eragrostis frankii C.A. Meyer
Tridens flavus (L.) Hitchcock
Muhlenbergia capillaris (Lam.) Trin.
Muhlenbergia schreberi J.F. Gmel.
Muhlenbergia sobolifera (Muhl.) Trin.
Muhlenbergia frondosa (Poir.) Fern.
Muhlenbergia racemosa (Michx.) BSP.
Muhlenbergia glabrifloris Scribn.
Muhlenbergia tenuiflora (Willd.) BSP.
Muhlenbergia sylvatica (Torr.) Torr.
Muhlenbergia mexicana (L.) Trin.
Sporobolus asper (Michx.) Kunth
Sporobolus clandestinus (Biehler) Hitchc.
Sporobolus vaginiflorus (Torr.) Wood
Eleusine indica (L.) Gaertn.
Leptochloa filiformis (Lam.) Beauv.
Leptochloa attenuata (Nutt.) Steud.
Cynodon dactylon (L.) Pers.
Bouteloua curtipendula (Michx.) Torr.
Aristida oligantha Michx.
Aristida purpurascens Poir.
Aristida longespica Poir.
Aristida dichotoma Michx.
Arundinaria gigantea (Walt.) Chapm.
Leersia oryzoides (L.) Swartz
Leersia virginica Willd.
Danthonia spicata (L.) Beauv.
Chasmanthium latifolium (Michx.) Yates
Cyperus densicaespitosus Mattf. & Kükenth.
Cyperus flavescens L.
Cyperus aristatus Rottb.
Cyperus ovularis (Michx.) Torr.
Cyperus filiculmis Vahl var. macilentus Fern.
Cyperus esculentus L.
Cyperus ferruginescens Boeckl.
Cyperus strigosus L.
Eleocharis obtusa (Willd.) Schult.

Scirpus atrovirens Willd.
Scirpus pendulus Muhl.
Carex retroflexa Muhl.
Carex texensis (Torr.) Bailey
Carex convoluta Mack.
Carex rosea Schk.
Carex cephalophora Muhl.
Carex muhlenbergii Schk.
Carex muhlenbergii Schk. var. enervis Boott
Carex sparganioides Muhl.
Carex vulpinoidea Michx.
Carex annectens Bickn.
Carex stipata Muhl.
Carex crus-corvi Shuttlew.
Carex scoparia Schk.
Carex tribuloides Wahlenb.
Carex projecta Mack.
Carex normalis Mack.
Carex festucacea Schk.
Carex brevior (Dewey) Mack.
Carex molesta Mack.
Carex jamesii Schwein.
Carex pensylvanica Lam.
Carex artitecta Mack.
Carex nigromarginata Schwein.
Carex umbellata Schk.
Carex hirtifolia Mack.
Carex shortiana Dewey
Carex hirsutella Mack.
Carex caroliniana Schwein.
Carex bushii Mack.
Carex virescens Muhl.
Carex swanii (Fern.) Mack.
Carex davisii Schwein. & Torr.
Carex granularis Muhl.
Carex amphibola Steud.
Carex grisea Wahlenb.
Carex flaccosperma Dewey
Carex glaucodea Tuckerm.
Carex oligocarpa Schk.
Carex tetanica Schk.
Carex digitalis Willd.
Carex laxiculmis Schwein.
Carex albursina Sheldon
Carex laxiflora Lam.
Carex blanda Dewey
Carex gracilescens Steud.
Carex frankii Kunth
Carex squarrosa L.
Carex typhina Michx.
Carex lacustris Willd.
Carex hyalinolepis Steud.
Carex lurida Wahlenb.
Carex grayi Carey
Carex lupulina Muhl.
Carex careyana Torr.

ARACEAE

Arisaema dracontium (L.) Schott
Arisaema triphyllum (L.) Schott var. triphyllum
Arisaema triphyllum (L.) Schott var. pusillum Peck

LEMNACEAE

Lemna minor L.

COMMELINACEAE

Tradescantia subaspera Ker var. subaspera
Tradescantia subaspera Ker var. montana (Shuttlew.) Anders. & Woodson
Tradescantia ohiensis Raf.
Tradescantia virginiana L.
Commelina diffusa Burm. f.
Commelina erecta L.

JUNCACEAE

Luzula multiflora (Retz.) Lejeune var. multiflora
Luzula multiflora (Retz.) Lejeune var. echinata (Small) Mohlenbr.
Juncus effusus L. var. solutus Fern. & Wieg.

Juncus biflorus Ell.
Juncus secundus Beauv.
Juncus tenuis Willd.
Juncus interior Wieg.

LILIACEAE

Lilium michiganense Farw.
Lilium superbum L.
Hemerocallis fulva L.
Camassia scilloides (Raf.) Cory
Erythronium americanum Ker
Erythronium albidum Nutt.
Uvularia grandiflora Sm.
Polygonatum commutatum (Schult.) A. Dietr.
Polygonatum biflorum (Walt.) Ell.
Smilacina racemosa (L.) Desf.
Asparagus officinalis L.
Allium tricoccum Ait.
Allium sativum L.
Allium ampeloprasum L. var. atroviolaceum (Boiss.) Regel
Allium canadense L.
Allium stellatum Ker
Allium vineale L.
Nothoscordum bivalve (L.) Britt.
Trillium recurvatum Beck
Trillium sessile L.
Trillium flexipes Raf.
Yucca filamentosa L. var. smalliana (Fern.) Ahles
Narcissus pseudo-narcissus L.
Polianthes virginica (L.) Shinners
Hypoxis hirsuta (L.) Coville

SMILACACEAE

Smilax glauca Walt. var. glauca
Smilax glauca Walt. var. leurophylla Blake
Smilax bona-nox L. var. bona-nox
Smilax bona-nox L. var. hederaefolia (Beyrich) Fern.
Smilax rotundifolia L.
Smilax hispida Muhl.
Smilax lasioneuron Hook.
Smilax pulverulenta Michx.

DIOSCOREACEAE

Dioscorea villosa L.
Dioscorea quaternata (Walt.) J.F. Gmel.
Dioscorea batatas Dcne.

IRIDACEAE

Iris shrevei Small
Iris pseudacorus L.
Iris cristata Ait.
Belamcanda chinensis (L.) DC.
Sisyrinchium angustifolium Mill.
Sisyrinchium albidum Raf.

ORCHIDACEAE

Cypripedium calceolus L. var. pubescens (Willd.) Correll
Orchis spectabilis L.
Habenaria peramoena Gray
Liparis liliifolia (L.) Rich.
Spiranthes ovalis Lindl.
Spiranthes cernua (L.) Rich.
Spiranthes tuberosa Raf.
Triphora trianthophora (Sw.) Rydb.
Corallorhiza wisteriana Conrad
Corallorhiza odontorhiza (Willd.) Nutt.
Hexalectris spicata (Walt.) Barnh.
Aplectrum hyemale (Muhl.) Torr.

SAURURACEAE

Saururus cernuus L.

SALICACEAE

Salix nigra Marsh.
Salix caroliniana Michx.
Salix amygdaloides Anderss.
Salix alba L.
Salix interior Rowlee
Salix rigida Muhl.
Populus deltoides Marsh.
Populus alba L.

JUGLANDACEAE

Juglans cinerea L.
Juglans nigra L.
Carya illinoensis (Wang.) K. Koch
Carya cordiformis (Wang.) K. Koch
Carya texana Buckl.
Carya pallida (Ashe) Engl. & Graebn.
Carya ovalis (Wang.) Sarg.
Carya glabra (Mill.) Sweet
Carya tomentosa (Poir.) Nutt.
Carya ovata (Mill.) K. Koch
Carya laciniosa (Michx.) Loud.

BETULACEAE

Betula nigra L.
Corylus americana Walt.
Ostrya virginiana (Mill.) K. Koch
Carpinus caroliniana Walt.

FAGACEAE

Fagus grandifolia Ehrh.
Quercus imbricaria Michx.
Quercus marilandica Muenchh.
Quercus falcata Michx.
Quercus pagoda Raf.
Quercus velutina Lam.
Quercus rubra L.
Quercus palustris Muenchh.
Quercus shumardii Buckley
Quercus coccinea Muenchh.
Quercus muhlenbergii Engelm.
Quercus alba L.
Quercus stellata Wangh.
Quercus macrocarpa Michx.
Quercus Xbushii Sarg.

ULMACEAE

Ulmus rubra Muhl.
Ulmus americana L.
Ulmus alata Michx.
Celtis occidentalis L.
Celtis laevigata Willd.
Celtis tenuifolia Nutt.

MORACEAE

Morus rubra L.
Morus alba L.
Broussonetia papyrifera (L.) L'Hér.
Maclura pomifera (Raf.) Schneider
Humulus lupulus L.
Cannabis sativa L.

URTICACEAE

Boehmeria cylindrica (L.) Sw.
Pilea pumila (L.) Gray
Laportea canadensis (L.) Wedd.
Parietaria pensylvanica Muhl.

SANTALACEAE

Comandra richardsiana Fern.

LORANTHACEAE

Phoradendron flavescens (Pursh) Nutt.

ARISTOLOCHIACEAE

Asarum canadense L. var. reflexum (Bickn.) Robins.
Aristolochia serpentaria L.
Aristolochia tomentosa Sims

POLYGONACEAE

Rumex acetosella L.
Rumex obtusifolius L.
Rumex crispus L.
Rumex altissimus Wood
Rumex mexicanus Meisn.
Polygonum sagittatum L.
Polygonum cristatum Engelm. & Gray
Polygonum scandens L.
Polygonum tenue Michx.
Polygonum aviculare L.
Polygonum ramosissimum Michx.
Polygonum virginianum L.
Polygonum punctatum Ell.
Polygonum persicaria L.
Polygonum cespitosum Blum var. longisetum (DeBruyn) Steward
Polygonum setaceum Baldw. var. interjectum Fern.
Polygonum hydropiperoides Michx.
Polygonum coccineum Muhl.
Polygonum lapathifolium L.
Polygonum pensylvanicum L.

CHENOPODIACEAE

Chenopodium ambrosioides L.
Chenopodium album L.
Chenopodium gigantospermum Aellen
Chenopodium standleyanum Aellen

AMARANTHACEAE

Amaranthus spinosus L.
Amaranthus albus L.
Amaranthus graecizans L.
Amaranthus retroflexus L.
Amaranthus hybridus L.
Amaranthus tamariscinus Nutt.
Froelichia gracilis (Hook) Moq.

NYCTAGINACEAE

Mirabilis nyctaginea (Michx.) MacM.

PHYTOLACCACEAE

Phytolacca americana L.

AIZOACEAE

Mollugo verticillatus L.

PORTULACACEAE

Portulaca oleracea L.
Claytonia virginica L.

CARYOPHYLLACEAE

Paronychia fastigiata (Raf.) Fern.
Sagina decumbens (Ell.) Torr. & Gray
Holosteum umbellatum L.
Stellaria media (L.) Cyrillo
Cerastium vulgatum L.
Cerastium nutans Raf.
Cerastium viscosum L.
Cerastium brachypodum (Engelm.) B.L. Robins.
Arenaria serpyllifolia L.
Dianthus barbatus L.
Silene stellata (L.) Ait.
Silene antirrhina L.
Saponaria officinalis L.

RANUNCULACEAE

Ranunculus pusillus Poir.
Ranunculus harveyi (Gray) Britt.
Ranunculus abortivus L.
Ranunculus micranthus Nutt.
Ranunculus recurvatus Poir.
Ranunculus hispidus Michx.
Ranunculus septentrionalis Poir.
Ranunculus sardous Crantz
Delphinium ajacis L.
Delphinium tricorne Michx.
Thalictrum revolutum DC.
Thalictrum dasycarpum Fisch. & Lall. var. hypoglaucum (Rydb.) Boivin
Thalictrum dioicum L.
Actaea pachypoda Ell.
Hepatica nobilis Schreb. var. acuta (Pursh) Steyerm.
Hydrastis canadensis L.
Isopyrum biternatum (Raf.) Torr. & Gray
Anemonella thalictroides (L.) Spach
Anemone virginiana L.
Myosurus minimus L.
Aquilegia canadensis L.
Clematis virginiana L.
Clematis pitcheri Torr. & Gray

BERBERIDACEAE

Berberis thunbergii DC.*
Berberis canadensis Mill.
Podophyllum peltatum L.
Caulophyllum thalictroides (L.) Michx.

MENISPERMACEAE

Calycocarpum lyonii (Pursh) Gray
Menispermum canadense L.
Cocculus carolinus (L.) DC.

MAGNOLIACEAE

Liriodendron tulipifera L.

ANNONACEAE

Asimina triloba (L.) Dunal

LAURACEAE

Sassafras albidum (Nutt.) Nees
Lindera benzoin (L.) Blume

PAPAVERACEAE

Sanguinaria canadensis L.
Stylophorum diphyllum (Michx.) Nutt.
Dicentra cucullaria (L.) Bernh.
Dicentra canadensis (Goldie) Walp.
Corydalis flavula (Raf.) DC.

CAPPARIDACEAE

Polanisia dodecandra (L.) DC.

CRUCIFERAE

Dentaria laciniata Muhl.
Capsella bursa-pastoris (L.) Medic.
Arabis canadensis L.
Arabis laevigata (Muhl.) Poir.
Arabis hirsuta (L.) Scop. var. adpressipilis (M. Hopkins) Rollins
Descurainia pinnata (Walt.) Britt. var. brachycarpa (Richards.) Fern.
Cardamine hirsuta L.
Cardamine pensylvanica Muhl.

Figs. 3 & 4. Close-up photos of Indian petroglyphs located on large overhanging bluffs of Fountain Bluff. Photos by Dave E. Mueller.

Cardamine parviflora L. var. arenicola (Britt.) O.E. Schulz
Draba verna L.
Draba reptans (Lam.) Fern.
Draba brachycarpa Nutt.
Arabidopsis thaliana (L.) Heynh.
Lepidium virginicum L.
Nasturtium officinale R. Br.
Thlaspi arvense L.
Barbarea vulgaris R. Br.
Brassica hirta Moench
Brassica kaber (DC.) L.C. Wheeler var. pinnatifida (Stokes) L.C. Wheeler
Sisymbrium officinale (L.) Scop.
Rorippa sessiliflora (Nutt.) Hitchc.
Rorippa islandica (Oeder) Borbas var. fernaldiana Butt. & Abbe

CRASSULACEAE

Sedum sarmentosum Bunge*
Sedum telephium L.*

SAXIFRAGACEAE

Philadelphus inodorus L.
Hydrangea arborescens L.
Ribes cynosbati L.
Mitella diphylla L.
Heuchera parviflora Bartl. var. rugelii (Shuttlw.) Rosend., Butt. & Lak.
Heuchera hirsuticaulis (Wheelock) Rydb.
Penthorum sedoides L.

HAMAMELIDACEAE

Liquidambar styraciflua L.

PLATANACEAE

Platanus occidentalis L.

ROSACEAE

Spiraea prunifolia Sieb. & Zucc.*
Prunus persica (L.) Batsch.*
Prunus hortulana Bailey
Prunus munsoniana Wight & Hedrick
Prunus angustifolia Marsh.
Prunus mexicana S. Wats.
Prunus americana Marsh. var. lanata Sudw.
Prunus avium L.*
Prunus serotina Ehrh.
Amelanchier arborea (Michx. f.) Fern.
Pyrus communis L.*
Malus pumila Mill.*
Malus ioensis (Wood) Britt.
Crataegus phaenopyrum (L. f.) Medic.
Crataegus crus-galli L.
Crataegus engelmannii Sarg.
Crataegus calpodendron (Ehrh.) Medic.
Crataegus viridis L.
Crataegus pruinosa (Wendl.) K. Koch
Crataegus mollis (Torr. & Gray) Scheele
Rubus occidentalis L.
Rubus trivialis Michx.
Rubus flagellaris Willd.
Rubus allegheniensis Porter
Rosa multiflora Thunb.
Rosa setigera Michx.
Rosa carolina L.
Rosa wichuriana Crepin
Potentilla simplex Michx.
Potentilla recta L.
Potentilla norvegica L.
Fragaria virginiana Duchesne

Aruncus dioicus (Walt.) Fern.
Gillenia stipulata (Muhl.) Baill.
Geum canadense Jacq.
Geum vernum (Raf.) Torr. & Gray
Geum virginianum L.
Agrimonia parviflora Ait.
Agrimonia pubescens Wallr.
Agrimonia rostellata Wallr.

LEGUMINOSAE

Cercis canadensis L.
Gymnocladus dioica (L.) K. Koch
Gleditsia triacanthos L.
Desmanthus illinoensis (Michx.) MacM.
Albizia julibrissin Duraz.*
Amorpha fruticosa L.
Robinia pseudoacacia L.
Crotalaria sagittalis L.
Psoralea psoralioides (Walt.) Cory var. eglandulosa (Ell.) Freeman
Vicia villosa Roth
Cassia tora L.
Cassia marilandica L.
Cassia fasciculata Michx.
Cassia nictitans L.
Apios americana Medic.
Petalostemum candidum (Willd.) Michx.
Petalostemum purpureum (Vent.) Rydb.
Coronilla varia L.
Tephrosia virginiana (L.) Pers.
Astragalus canadensis L.
Melilotus alba Desr.
Melilotus officinalis (L.) Lam.
Trifolium dubium Sibth.
Trifolium pratense L.
Trifolium repens L.
Trifolium hybridum L.
Medicago sativa L.
Medicago lupulina L.
Stylosanthes biflora (L.) BSP.
Lespedeza striata (Thunb.) Hook. & Arn.
Lespedeza stipulacea Maxim.
Lespedeza procumbens Michx.
Lespedeza repens (L.) Bart.
Lespedeza hirta (L.) Hornem.
Lespedeza stuevei Nutt.
Lespedeza cuneata (Dum.-Cours.) G. Don
Lespedeza violacea (L.) Pers.
Lespedeza intermedia (S. Wats.) Britt.
Lespedeza virginica (L.) Britt.
Phaseolus polystachios (L.) BSP.
Desmodium nudiflorum (L.) DC.
Desmodium glutinosum (Muhl.) Wood
Desmodium pauciflorum (Nutt.) DC.
Desmodium rotundifolium DC.
Desmodium illinoense Gray
Desmodium canescens (L.) DC.
Desmodium cuspidatum (Muhl.) Loud.
Desmodium laevigatum (Nutt.) DC.
Desmodium marilandicum (L.) DC.
Desmodium rigidum (Ell.) DC.
Desmodium nuttallii (Schindl.) Schub.
Desmodium dillenii Darl.
Desmodium paniculatum (L.) DC.
Glycine max (L.) Merr.*
Strophostyles leiosperma (Torr. & Gray) Piper
Strophostyles helvola (L.) Ell.
Strophostyles umbellata (Muhl.) Britt.
Galactia volubilis (L.) Britt. var. mississippiensis Vail
Amphicarpa bracteata (L.) Fern. var. bracteata
Amphicarpa bracteata (L.) Fern. var. comosa (L.) Fern.

LINACEAE

Linum medium (Planch.) Britt. var. texanum (Planch.) Fern.

OXALIDACEAE

Oxalis violacea L.
Oxalis dillenii Jacq.
Oxalis stricta L.

GERANIACEAE

Geranium maculatum L.
Geranium carolinianum L.

RUTACEAE

Xanthoxylum americanum Mill.

SIMAROUBACEAE

Ailanthus altissima (Mill.) Swingle

POLYGALACEAE

Polygala verticillata L.

EUPHORBIACEAE

Phyllanthus caroliniensis Walt.
Croton glandulosus L. var. septentrionalis Muell.-Arg.
Croton monanthogynus Michx.
Crotonopsis elliptica Willd.
Acalypha ostryaefolia Riddell
Acalypha rhomboidea Raf.
Acalypha virginica L.
Acalypha gracilens Gray
Euphorbia corollata L.
Poinsettia dentata (Michx.) Kl. & Garcke
Chamaesyce supina (Raf.) Moldenke
Chamaesyce humistrata (Engelm.) Small
Chamaesyce maculata (L.) Small

CALLITRICHACEAE

Callitriche heterophylla Pursh
Callitriche terrestris Raf.

ANACARDIACEAE

Toxicodendron radicans (L.) Kuntze
Rhus copallina L.
Rhus glabra L.
Rhus aromatica Ait.

AQUIFOLIACEAE

Ilex decidua Walt.

CELASTRACEAE

Euonymus obovatus Nutt.
Euonymus atropurpureus Jacq.
Celastrus scandens L.

STAPHYLEACEAE

Staphylea trifolia L.

ACERACEAE

Acer negundo L.
Acer barbatum Michx.
Acer saccharum Marsh.
Acer saccharinum L.
Acer rubrum L.

HIPPOCASTANACEAE

Aesculus discolor Pursh
Aesculus glabra Willd.

BALSAMINACEAE

Impatiens biflora Walt.
Impatiens pallida Nutt.

RHAMNACEAE

Ceanothus americanus L. var. pitcheri Torr. & Gray
Rhamnus caroliniana Walt.

VITACEAE

Parthenocissus quinquefolia (L.) Planch.
Ampelopsis cordata Michx.
Vitis aestivalis Michx.
Vitis cinerea Engelm.
Vitis vulpina L.
Vitis palmata Vahl.
Vitis riparia Michx.

TILIACEAE

Tilia americana L.

MALVACEAE

Malva neglecta Wallr.
Hibiscus lasiocarpus Cav.
Sida spinosa L.

HYPERICACEAE

Ascyrum hypericoides L. var. multicaule (Michx.) Fern.
Hypericum perforatum L.
Hypericum punctatum Lam.
Hypericum spathulatum (Spach.) Steud.
Hypericum sphaerocarpum Michx.
Hypericum mutilum L.
Hypericum gentianoides (L.) BSP.
Hypericum drummondii (Grev. & Hook.) Torr. & Gray

CISTACEAE

Lechea tenuifolia Michx.

VIOLACEAE

Hybanthus concolor (T. F. Forst.) Spreng.
Viola cucullata Ait.
Viola pratincola Greene
Viola missouriensis Greene
Viola sororia Willd.
Viola triloba Schwein. var. dilatata (Ell.) Brainerd
Viola pubescens Ait. var. eriocarpa (Schwein.) Russell
Viola striata Ait.
Viola rafinesquii Greene

PASSIFLORACEAE

Passiflora lutea L. var. glabriflora Fern.

CACTACEAE

Opuntia compressa (Salisb.) Macbr.

ELAEAGNACEAE

Elaeagnus umbellata Thunb.

LYTHRACEAE

Cuphea petiolata (L.) Koehne
Lythrum alatum Pursh
Rotala ramosior (L.) Koehne
Ammannia coccinea Rottb.

NYSSACEAE

Nyssa sylvatica Marsh.

ONAGRACEAE

Circaea quadrisulcata (Maxim.) Franch. & Sav. var. canadensis (L.) Hara
Ludwigia palustris (L.) Ell. var. americana (DC.) Fern. & Grisc.
Ludwigia alternifolia L.
Jussiaea repens L.
Oenothera laciniata Hill
Oenothera biennis L.

ARALIACEAE

Aralia spinosa L.
Aralia racemosa L.
Panax quinquefolius L.

UMBELLIFERAE

Thaspium trifoliatum (L.) Gray
Sanicula gregaria Bickn.
Sanicula canadensis L.
Daucus carota L.
Cryptotaenia canadensis (L.) DC.
Sium suave Walt.
Osmorhiza longistylis (Torr.) DC.
Osmorhiza claytonii (Michx.) Clarke
Erigenia bulbosa (Michx.) Nutt.
Chaerophyllum procumbens (L.) Crantz
Chaerophyllum tainturieri Hook.
Taenidia integerrima (L.) Drude
Polytaenia nuttallii DC.
Cicuta maculata L.

CORNACEAE

Cornus florida L.
Cornus drummondii C.A. Mey.

ERICACEAE

Monotropa hypopithys L.
Monotropa uniflora L.
Vaccinium arboreum Marsh.
Vaccinium vacillans Torr.

PRIMULACEAE

Dodecatheon meadia L.
Samolus parviflorus Raf.
Anagallis arvensis L.
Lysimachia ciliata L.
Lysimachia lanceolata Walt.
Lysimachia nummularia L.

EBENACEAE

Diospyros virginiana L.

OLEACEAE

Fraxinus quadrangulata Michx.
Fraxinus pensylvanica Marsh.
Fraxinus americana L. var. americana
Fraxinus americana L. var. biltmoreana (Beadle) J. Wright
Syringa vulgaris L.*
Ligustrum obtusifolium Sieb. & Zucc.*

GENTIANACEAE

Swertia caroliniensis (Walt.) Kuntze
Obolaria virginica L.
Sabatia angularis (L.) Pursh

APOCYNACEAE

Apocynum Xmedium Greene
Apocynum cannabinum L.
Apocynum cannabinum L. var. pubescens (Mitchell) A. DC.

ASCLEPIADACEAE

Asclepias tuberosa L. var. interior (Woodson) Shinners
Asclepias verticillata L.
Asclepias viridiflora Raf.
Asclepias purpurascens L.
Asclepias syriaca L.
Asclepias quadrifolia Jacq.
Asclepias variegata L.
Asclepias exaltata L.
Asclepias incarnata L.
Cynanchum laeve (Michx.) Pers.

CONVOLVULACEAE

Convolvulus arvensis L.
Calystegia sepium (L.) R. Br. var. americana (Sims) Mohlenbr.
Ipomoea pandurata (L.) G.F.W. Mey.
Ipomoea hederacea (L.) Jacq.
Ipomoea lacunosa L.
Ipomoea purpurea (L.) Roth
Cuscuta cuspidata Engelm.
Cuscuta polygonorum Engelm.
Cuscuta gronovii Willd.
Cuscuta indecora Choisy

POLEMONIACEAE

Polemonium reptans L.
Phlox bifida Beck
Phlox divaricata L.
Phlox pilosa L.
Phlox paniculata L.

HYDROPHYLLACEAE

Hydrophyllum appendiculatum Mich.
Hydrophyllum canadense L.
Phacelia purshii Buckley
Phacelia bipinnatifida Michx.

BORAGINACEAE

Mertensia virginica (L.) Pers.
Cynoglossum virginianum L.
Hackelia virginiana (L.) I.M. Johnston
Myosotis virginica (L.) BSP.
Myosotis virginica (L.) BSP. var. macrosperma (Engelm.) Fern.
Lithospermum arvense L.
Lithospermum latifolium Michx.
Lithospermum canescens (Michx.) Lehm.

VERBENACEAE

Lippia lanceolata Michx.
Verbena canadensis Britt.
Verbena bracteata Lag. & Rodr.
Verbena simplex Lehm.
Verbena stricta Vent.
Verbena hastata L.
Verbena urticifolia L.

PHRYMACEAE

Phryma leptostachya L.

LABIATAE

Isanthus brachiatus (L.) BSP.
Mentha arvensis L.
Mentha arvensis L. var. villosa (Benth.) S.R. Steward
Lycopus americanus Muhl.
Lycopus virginicus L.
Lycopus rubellus Moench
Teucrium canadense L. var. virginicum (L.) Eat.
Scutellaria parvula Michx.
Scutellaria ovata Hill
Scutellaria elliptica Muhl.
Scutellaria incana Biehler
Cunila origanoides (L.) Britt.
Monarda bradburiana Beck

Monarda fistulosa L.
Blephilia ciliata (L.) Benth.
Blephilia hirsuta (Pursh) Benth.
Collinsonia canadensis L.
Hedeoma hispida Pursh
Hedeoma pulegioides (L.) Pers.
Pycnanthemum tenuifolium Schrad.
Pycnanthemum pilosum Nutt.
Agastache nepetoides (L.) Ktze.
Nepeta cataria L.
Lamium amplexicaule L.
Lamium purpureum L.
Stachys palustris L. var. homotricha Fern.
Stachys tenuifolia Willd.
Leonurus cardiaca L.
Perilla frutescens L.
Physostegia virginiana (L.) Benth.
Prunella vulgaris L.
Prunella vulgaris L. var. lanceolata (Bart.) Fern.

SOLANACEAE

Solanum carolinense L.
Solanum americanum Mill.
Datura stramonium L.
Physalis longifolia Nutt.
Physalis pruinosa L.
Physalis virginiana Mill.
Physalis heterophylla Nees
Physalis heterophylla Nees var. ambigua (Gray) Rydb.
Physalis pubescens L.
Physalis lanceolata Michx.
Petunia axillaris (Lam.) BSP.

SCROPHULARIACEAE

Paulownia tomentosa (Thunb.) Steud.
Veronicastrum virginicum (L.) Farw.
Veronica peregrina L.
Veronica arvensis L.
Gratiola neglecta Torr.
Lindernia anagallidea (Michx.) Pennell
Lindernia dubia (L.) Pennell
Penstemon digitalis Nutt.
Penstemon calycosus Small
Penstemon pallidus Small
Conobea multifida (Michx.) Benth.
Pedicularis canadensis L.
Gerardia flava L.
Gerardia gattingeri Small
Gerardia tenuifolia Vahl
Seymeria macrophylla Nutt.
Mimulus alatus Ait.
Scrophularia marilandica L.
Verbascum thapsus L.
Verbascum blattaria L.

BIGNONIACEAE

Campsis radicans (L.) Seem.
Catalpa bignonioides Walt.

OROBANCHACEAE

Epifagus virginiana (L.) Bart.
Orobanche uniflora L.

ACANTHACEAE

Ruellia humilis Nutt.
Ruellia pedunculata Torr.
Ruellia strepens L.

PLANTAGINACEAE

Plantago aristata Michx.
Plantago pusilla Nutt.
Plantago lanceolata L.
Plantago virginica L.
Plantago rugelii Dcne.
Plantago major L.

RUBIACEAE

Cephalanthus occidentalis L.
Galium circaezans Michx.
Galium pilosum Ait.
Galium triflorum Michx.
Galium aparine L.
Galium tinctorium L.
Galium concinnum Torr. & Gray
Galium obtusum Bigel.
Diodia teres Walt.
Spermacoce glabra Michx.
Mitchella repens L.
Houstonia minima Beck
Houstonia pusilla Schoepf
Houstonia nigricans (Lam.) Fern.
Houstonia longifolia Gaertn. var. longifolia
Houstonia longifolia Gaertn. var. tenuifolia (Nutt.) Wood

CAPRIFOLIACEAE

Sambucus canadensis L.
Lonicera prolifera (Kirchn.) Rehd.
Lonicera dioica L. var. glaucescens
Lonicera japonica Thunb.
Symphoricarpos orbiculatus Moench
Viburnum rufidulum Raf.
Viburnum prunifolium L.
Triosteum angustifolium L.

VALERIANACEAE

Valeriana pauciflora Michx.
Valerianella radiata (L.) Dufr.

CUCURBITACEAE

Cucurbita pepo L. var. ovifera (L.) Alef.
Melothria pendula L.
Sicyos angulatus L.

CAMPANULACEAE

Specularia biflora (R. & P.) Fisch. & Mey.
Specularia perfoliata (L.) A. DC.
Campanula rotundifolia L.
Campanula americana L.
Lobelia silphilitica L.
Lobelia inflata L.

COMPOSITAE

Polymnia uvedalia (L.) L.
Silphium perfoliatum L.
Silphium terebinthinaceum Jacq.
Silphium integrifolium Michx.
Parthenium integrifolium L.
Iva annua L.
Ambrosia bidentata Michx.
Ambrosia trifida L.
Ambrosia artemisiifolia L.
Xanthium strumarium L. var. canadensis (Mill.) Torr. & Gray
Heliopsis helianthoides (L.) Sweet
Eclipta alba (L.) Hassk.
Rudbeckia laciniata L.
Rudbeckia subtomentosa Pursh
Rudbeckia hirta L.
Echinacea purpurea (L.) Moench
Ratibida pinnata (Vent.) Barnh.
Helianthus annuus L.
Helianthus microcephalus Torr. & Gray
Helianthus decapetalus L.
Helianthus divaricatus L.
Helianthus strumosus L.
Helianthus grosseserratus Martens
Helianthus tuberosus L.
Helianthus hirsutus Raf.
Verbesina helianthoides Michx.
Verbesina alternifolia (L.) Britt.

Coreopsis palmata Nutt.
Coreopsis tinctoria Nutt.
Coreopsis tripteris L.
Bidens cernua L.
Bidens aristosa L.
Bidens bipinnata L.
Bidens frondosa L.
Bidens vulgata Greene
Heterotheca villosa (Pursh) Shinners
Solidago caesia L.
Solidago flexicaulis L.
Solidago bicolor L. var. concolor Torr. & Gray
Solidago buckleyi Torr. & Gray
Solidago petiolaris Ait.
Solidago missouriensis Nutt.
Solidago juncea Ait.
Solidago speciosa Nutt.
Solidago gigantea Ait.
Solidago ulmifolia Muhl.
Solidago drummondii Torr. & Gray
Solidago radula Nutt.
Solidago canadensis L.
Solidago nemoralis Ait.
Solidago rugosa Mill.
Boltonia asteroides (L.) L'Hér.
Aster anomalus Engelm.
Aster shortii Lindl.
Aster cordifolius L.
Aster sagittifolius Wedem.
Aster sagittifolius Wedem. var. drummondii (Lindl.) Shinners
Aster oblongifolius Nutt.
Aster patens Ait.
Aster pilosus Willd.
Aster vimineus Lam.
Aster praealtus Poir.
Aster turbinellus Lindl.
Aster ontarionis Wieg.
Aster lateriflorus (L.) Britt.
Aster simplex Willd.
Erigeron pulchellus Michx.
Erigeron philadelphicus L.
Erigeron annuus (L.) Pers.
Erigeron strigosus Muhl.
Erigeron divaricatus Michx.
Erigeron canadensis L.
Achillea millefolium L.
Matricaria matricarioides (Less.) Porter
Chrysanthemum leucanthemum L.
Artemisia annua L.
Antennaria plantaginifolia (L.) Richards. var. plantaginifolia
Antennaria plantaginifolia (L.) Richards. var. arnoglossa (Greene) Cronq.
Gnaphalium purpureum L.
Gnaphalium obtusifolium L.
Erechtites hieracifolia (L.) Raf.
Cacalia muhlenbergii (Sch.-Bip.) Fern.
Senecio aureus L.
Senecio plattensis Nut.
Senecio glabellus Poir.
Eupatorium purpureum L.
Eupatorium coelestinum L.
Eupatorium serotinum Michx.
Eupatorium rugosum Houtt.
Eupatorium altissimum L.
Brickellia eupatorioides (L.) Shinners
Liatris cylindracea Michx.
Liatris aspera Michx.
Vernonia missurica Raf.
Vernonia baldwinii Torr.
Elephantopus carolinianus Willd.
Arctium minus (Hill) Bernh.
Cirsium vulgare (Savi) Tenore
Cirsium discolor (Muhl.) Spreng.
Cirsium altissimum (L.) Spreng.
Centaurea maculosa Lam.
Centaurea cyanus L.
Cichorium intybus L.
Krigia dandelion (L.) Nutt.
Krigia biflora (Walt.) Blake
Krigia oppositifolia Raf.
Tragopogon dubius Scop.

Taraxacum officinale Weber
Taraxacum laevigatum (Willd.) DC.
Sonchus asper (L.) Hill
Lactuca canadensis L.
Lactuca serriola L.
Lactuca saligna L.
Lactuca floridana (L.) Gaertn.
Pyrrhopappus carolinianus (Walt.) DC.
Prenanthes altissima L.
Hieracium scabrum Michx.
Hieracium gronovii L.

EDITOR'S NOTE: The taxa in the above list are not underlined due to the reduction in print which would make them difficult to read.

Fig. 5. Bend along the Mississippi River as seen from the top of Fountain Bluff. Photo by Dave E. Mueller.

Fountain Bluff Endangered and Threatened Species

Fountain Bluff is home to several species considered endangered or threatened in the state of Illinois (Natural Land Institute, 1981). They are:

Berberis canadensis
Carex nigromarginata
Carya pallida
Hexalectris spicata
Hydrastis canadensis
Lilium superbum
Panax quinquefolius
Panicum nitidum
Paspalum bushii

Other rare taxa for southern Illinois that have been found at Fountain Bluff are Lycopodium lucidulum, Asplenium Xebenoides, Carex swanii, Tradescantia subaspera var. montana (only Illinois location; nearest known station is in West Virginia), Allium tricoccum, Iris cristata, Spiranthes ovalis, Aristolochia tomentosa, Draba reptans, Geum virginianum, Xanthoxylum americanum, Viola cucullata, Lonicera dioica var. glaucescens (only Illinois location), and Melothria pendula.

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NATURAL LAND INSTITUTE. 1981. Endangered and threatened vertebrate animals and vascular plants of Illinois. Illinois Department of Conservation. 189 pp.

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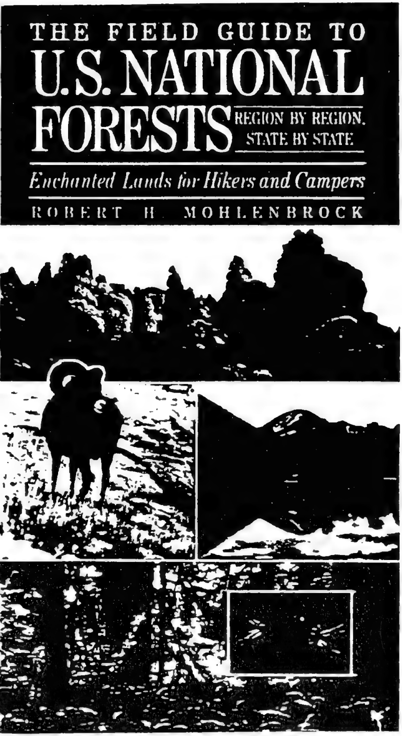

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ILLINOIS THREATENED & ENDANGERED PLANTS:

BISHOP'S-WEEDS OF THE GENUS *Ptilimnium* (APIACEAE) IN ILLINOIS

Robert H. Mohlenbrock[1]

In the first and second editions of Jones' *Flora of Illinois* (1945; 1950), two species of the umbelliferous genus *Ptilimnium* were reported from Illinois. Both *P. capillaceum* and *P. nuttallii* were listed as rare in swamps and swampy ground in southern Illinois.

When Jones, *et al*. (1955) were preparing their book of distribution maps of Illinois plants, they apparently wished to review the status of this genus in Illinois. Accordingly, Mr. Harry Ahles, Jones' assistant, contacted me in 1954 while I was a graduate student at Southern Illinois University and asked me if I would collect *Ptilimnium capillaceum* from a previous collection site of this species around Campbell Lakes, near Elkville, Jackson County.

I went to Campbell Lakes and, while exploring in marshy terrain, found several specimens of *Ptilimnium*, all apparently of the same species. Much to my surprise, they keyed out to *Ptilimnium costatum*, a species not attributed to Illinois. They were not *Ptilimnium capillaceum*!! When I reported this to Ahles, he and I undertook a close check of all the *Ptilimnium capillaceum* specimens deposited at the University of Illinois, Illinois State Museum, the Illinois Natural History Survey, and Southern Illinois University. All proved to be *Ptilimnium costatum*. In addition, a few specimens previously identified and filed as *Carum carvi* were also *P. costatum*.

I spent the summer of 1954 trying to relocate all previous Illinois stations for both *Ptilimnium capillaceum* and *P. nuttallii*. Authentic *P. capillaceum* could not be found, nor has it been discovered in Illinois to this date. It has been stricken from the Illinois flora.

Ptilimnium costatum was discovered in Union County (LaRue Swamp)

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[1]Robert H. Mohlenbrock is Distinguished Professor of Botany at Southern Illinois University, Carbondale.

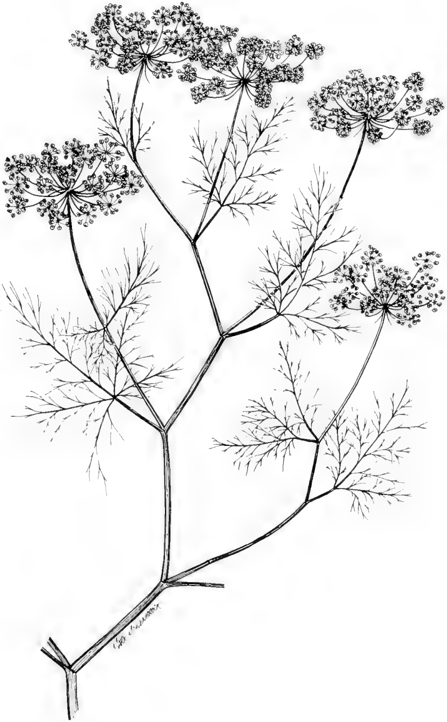

Fig. 1. Bishop's-weed, <u>Ptilimnium</u> <u>costatum</u>. *Illustration by Mark W. Mohlenbrock.*

and Massac County (near Mermet), as well as at several Jackson County locations (Campbell Lakes and near Howardton). The Pulaski County site, based on a collection by Fricke, without locality or date, was not rediscovered.

As for Ptilimnium nuttallii, I was unable to relocate any of the prior sites in Jackson, Pulaski, Randolph, and St. Clair counties, even though the Jackson and Randolph collections were made as recently as 1950. The species was relocated in the LaRue Swamp of Union County, where it still occurs.

For anyone interested in trying to find Ptilimnium costatum, P. nuttallii, or P. capillaceum, the following key is provided:

1. Bracts at base of umbel branches 3-parted-------P. capillaceum
1. Bracts at base of umbel branches entire----------------------2

    2. Leaflets whorled; fruits about 3.0 mm long------P. costatum
    2. Leaflets opposite or alternate; fruits about 1.5 mm long--P. nuttallii

Look for these white-flowered umbelliferous plants that grow 3-4 feet tall in marshy ground, around ponds, at the edges of swamps, or in roadside ditches during July and August.

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NOMENCLATURAL EQUIVALENCIES IN THE ILLINOIS FLORA II. Dicots (Part 1)

Robert H. Mohlenbrock[1]

In Erigenia 3 (1983), I published the first of a series of articles equating the scientific names used in my Guide to the Vascular Flora of Illinois (1975) with two recent publications (Kartesz & Kartesz, 1980; United States Department of Agriculture, 1982) that are intended to standardize the nomenclature of the flowering plants of the United States. The first article in this series covered the monocots, while this article deals with a portion of the dicots.

Many nomenclatural changes for plants in the Illinois flora were suggested by both of these recent works as a result of more recent systematic treatment of various plant groups. Not only are there substantial changes from the nomenclature used in 1975 in the Guide to the Vascular Flora of Illinois, the two more recent works differ considerably from each other. I am making no effort in this article to evaluate the merits of these two works.

In this article, I am presenting the nomenclatural changes between my 1975 guide and the two later checklists. In the format below, Column I lists the nomenclature used in my Guide to the Vascular Flora of Illinois; Column II lists the nomenclature accepted by Kartesz & Kartesz (1980); Column III enumerates the nomenclature recognized by the United States Department of Agriculture (1982).

In the listings below, if there is a blank in either columns II or III, it indicates that the nomenclature used in that work is identical with the one used in Guide to the Vascular Flora of Illinois. If the term synonym appears in column I, it means that the taxon in either or both columns II and III was considered synonymous and therefore not recognized as valid in the Guide to the Vascular Flora of Illinois.

[1]Robert H. Mohlenbrock is Distinguished Professor of Botany at Southern Illinois University, Carbondale.

I	II	III
Salix interior Rowlee	S. exigua Nutt.	
Salix Xmyricoides (Muhl.) Carey	S. myricoides Muhl.	S. myricoides Muhl.
Salix glaucophylloides Fern. var. glaucophylla (Bebb) Schneid.	S. myricoides Muhl.	S. myricoides Muhl.
Salix syrticola Fern.	S. cordata Michx.	S. cordata Michx.
Salix pedicellaris Pursh var. hypoglauca Fern.	S. pedicellaris Pursh	S. pedicellaris Pursh
Populus tremuloides Michx.		P. tremula L. ssp. tremuloides (Michx.) Löve & Löve
Populus canescens (Ait.) Sm.	P. Xcanescens (Ait.) Sm.	P. Xcanescens (Ait.) Sm.
Populus Xgileadensis Rouleau	P. Xjackii Sarg.	P. Xjackii Sarg.
Comptonia peregrina (L.) Coult.		Myrica asplenifolia L.
Betula lutea Michx. f.	B. alleghaniensis Britt.	B. alleghaniensis Britt.
Alnus rugosa (DuRoi) Spreng. var. americana (Regel) Fern.	A. incana (L.) Moench ssp. rugosa (DuRoi) Clausen	
Quercus Xanceps E.J. Palmer	Q. Xpalmeriana A. Camus	Q. Xpalmerana A. Camus

I	II	III
Quercus pagodaefolia (Ell.) Ashe	*Q. pagoda* Raf.	*Q. falcata* Michx. var. *pagodaefolia* Ell.
Quercus Xhillii Trelease	*Q. Xschuettei* Trelease	*Q. Xschuettei* Trelease
Quercus Xfallax E. J. Palmer	*Q. Xdeamii* Trel.	*Q. Xdeamii* Trel.
Quercus prinus L.	*Q. montana* Willd.	
Morus alba L. var. *tatarica* (L.) Loudon	*M. alba* L.	*M. alba* L.
Pilea opaca (Lunell) Rydb.	*P. fontana* (Lunell) Rydb.	*P. fontana* (Lunell) Rydb.
Comandra richardsiana Fern.	*C. umbellata* (L.) Nutt.	*C. umbellata* (L.) Nutt.
Phoradendron flavescens (Pursh) Nutt.	*P. serotinum* (Raf.) M.C. Johnston	
Aristolochia serpentaria L. var. *hastata* (Nutt.) Duchartre	*A. serpentaria* L.	*A. serpentaria* L.
Brunnichia cirrhosa Banks	*B. ovata* (Walt.) Shinners	
Rumex maritimus L. var. *fueginus* (Phil.) Dusen		*R. fueginus* Phil.
Rumex mexicanus Meisn.	*R. triangulivalvis* (Danser) Rech. f.	*R. triangulivalvis* (Danser) Rech. f.

I	II	III
Polygonum cristatum Engelm. & Gray	P. scandens L. var. cristatum (Engelm. & Gray) Gleason	P. scandens L. var. cristatum (Engelm. & Gray) Gleason
Polygonum aviculare L. var. littorale (Link) W.D.J. Koch	P. buxiforme Small	P. buxiforme Small
Polygonum prolificum (Small) Robins.	P. ramosissimum Michx. var. prolificum Small	P. ramosissimum Michx. var. prolificum Small
Polygonum exsertum Small	P. ramosissimum Michx.	P. ramosissimum Michx.
Polygonum coccineum Muhl.	P. amphibium L. var. emersum Michx.	P. amphibium L. var. emersum Michx.
Polygonum longistylum Small	P. pensylvanicum L.	P. pensylvanicum L.
Polygonum scabrum Moench	P. lapathifolium L.	P. lapathifolium L.
Salsola kali L. var. tenuifolia Tausch	S. iberica Sennen & Pau	
Chenopodium ambrosioides L. var. anthelminticum (L.) Gray	C. ambrosioides L.	C. ambrosioides L.
Amaranthus graecizans L.	A. blitoides S. Wats.	A. blitoides S. Wats.

I	II	III
Amaranthus torreyi (Gray) Benth.	A. bigelovii Uline & Bray	
Amaranthus ambigens Standl.	A. tuberculatus (Moq.) Sauer	A. tuberculatus (Moq.) Sauer
Amaranthus tamariscinus Nutt.	A. rudis Sauer	A. rudis Sauer
Cerastium vulgatum L.	C. fontanum Baumg. ssp. trivialis (Link) Jalas	
Cerastium velutinum Raf.	C. arvense L.	C. arvense L.
Cerastium tetrandrum Curtis	C. diffusum Pers.	
Cerastium viscosum L.	C. glomeratum Thuill.	
Cerastium brachypodum (Engelm.) B.L. Robins.	C. nutans Raf. var. brachypodum Engelm.	
Arenaria stricta Michx.	Minuartia michauxii (Fern.) Farw.	Minuartia michauxii (Fern.) Farw.
Arenaria patula Michx.	Minuartia patula (Michx.) Mattf.	Minuartia patula (Michx.) Mattf.
Arenaria lateriflora L.	Moehringia lateriflora (L.) Fenzl	?
Tunica saxifraga (L.) Scop.	Petrorhagia saxifraga (L.) Link	Petrorhagia saxifraga (L.) Link

I	II	III
Lychnis alba L.	*Silene alba* (P. Mill.) Krause	*S. pratensis* (Raf.) Gren. & Godr.
Lychnis dioica L.	*Silene dioica* (L.) Clairv.	*Silene dioica* (L.) Clairv.
Silene cucubalus Wibel	*S. vulgaris* (Moench) Garcke	*S. vulgaris* (Moench) Garcke
Saponaria vaccaria L.	*Vaccaria pyramidata* Medic.	*Vaccaria pyramidata* Medic.
Ceratophyllum echinatum Gray	*C. muricatum* Cham.	*C. muricatum* Cham.
Nymphaea tuberosa Paine	*N. odorata* Ait.	
Ranunculus trichophyllus Chaix	*R. aquatilis* L. var. *capillaceus* (Thuill.) DC.	
Ranunculus longirostris Godr.	*R. longirostre* Godr.	
Ranunculus abortivus L. var. *acrolasius* Fern.	*R. abortivus* L.	*R. abortivus* L. ssp. *acrolasius* (Fern.) Kapoor
Ranunculus hispidus Michx. var. *marilandicus* (Poir.) L. Benson	*R. hispidus* Michx. var. *falsus* Fern.	
Ranunculus septentrionalis Poir. var. *caricetorum* (Greene) Fern.	*R. septentrionalis* Poir.	*R. septentrionalis* Poir.

I	II	III
Delphinium ajacis L.	Consolida ambigua (L.) Ball & Heywood	Consolida ambigua (L.) Ball & Heywood
Thalictrum dasycarpum Fisch. & Lall. var. hypoglaucum (Rydb.) Boivin		T. dasycarpum Fisch. & Lall.
Isopyrum biternatum (Raf.) Torr. & Gray		Enemion biternatum Raf.
Anemonella thalictroides (L.) Spach	Thalictrum thalictroides (L.) Eames & Boivin	Thalictrum thalictroides (L.) Eames & Boivin
Anemone patens L.	Pulsatilla patens (L.) P. Mill. ssp. multifida (Pritz.) Zamel	Pulsatilla patens (L.) P. Mill. ssp. multifida (Pritz.) Zamel
Clematis dioscoreifolia Levl. & Vaniot	C. terniflora DC.	C. terniflora DC.
Lindera benzoin (L.) Blume var. pubescens (Palmer & Steyerm.) Rehd.		L. benzoin (L.) Blume
Sassafras albidum (Nutt.) Nees var. molle (Raf.) Fern.	S. albidum (Nutt.) Nees	S. albidum (Nutt.) Nees
Corydalis halei (Small) Fern. & Schub.	C. micrantha (Engelm.) Gray ssp. australis (Chapman) G.B. Ownbey	C. micrantha (Engelm.) Gray ssp. australis (Chapman) G.B. Ownbey

I	II	III
Corydalis campestris (Britt.) Buchholz & Palmer	C. micrantha (Engelm.) Gray ssp. australis (Chapman) G.B. Ownbey	C. micrantha (Engelm.) Gray ssp. australis (Chapman) G.B. Ownbey
Corydalis montana (Engelm.) Gray	C. aurea Willd. ssp. occidentalis (Engelm.) G.B. Ownbey	C. aurea Willd. ssp. occidentalis (Engelm.) G.B. Ownbey
Cruciferae	Brassicaceae	
Cakile edentula (Bigel.) Hook. var. lacustris Fern.	C. edentula (Bigel.) Hook. ssp. lacustris (Fern.) Holten	
Eruca sativa Mill.	E. vesicaria (L.) Cav. ssp. sativa (P. Mill.) Thellung	
Descurainia pinnata (Walt.) Britt. var. brachycarpa (Richards.) Fern.	D. pinnata (Walt.) Britt. ssp. brachycarpa (Richards.) Detling	D. pinnata (Walt.) Britt. ssp. brachycarpa (Richards.) Detling
Draba verna L.	Erophila verna (L.) Chev.	
Draba verna L. var. boerhaavii Van Hall	Erophila verna (L.) Chev. ssp. praecox (Steven) S.M. Walters	D. verna L. var. aestivalis Lej.
Draba reptans (Lam.) Fern. var. micrantha (Nutt.) Fern.	D. reptans (Lam.) Fern. ssp. stellifera (O.E. Schulz) Abrams	D. reptans (Lam.) Fern. var. stellifera (O.E. Schulz) Hitchc.
Armoracia lapathifolia Gilib.	A. rusticana (Lam.) Gaertn., Mey. & Scherb.	A. rusticana (Lam.) Gaertn., Mey. & Scherb.

I	II	III
Alliaria officinalis Andrz.	A. petiolata (Bieb.) Cavara & Grande	A. petiolata (Bieb.) Cavara & Grande
Brassica hirta Moench	Sinapis alba L.	Sinapis alba L.
Brassica kaber (DC.) L.C. Wheeler var. pinnatifida (Stokes) L.C. Wheeler	Sinapis arvensis L.	Sinapis arvensis L.
Brassica kaber (DC.) L.C. Wheeler var. schkuhriana (Reichenb.) L.C. Wheeler	Sinapis arvensis L.	Sinapis arvensis L.
Brassica rapa L.	B. rapa L. ssp. olifera DC.	
Rorippa islandica (Oeder) Borbas	R. palustris (L.) Bess.	R. palustris (L.) Bess.
Rorippa islandica (Oeder) Borbas var. fernaldiana Butt. & Abbe	R. palustris (L.) Bess. ssp. glabra (O.E. Schulz) R. Stuckey	R. palustris (L.) Bess. ssp. glabra (O.E. Schulz) R. Stuckey
Rorippa islandica (Oeder) Borbas var. hispida (Desv.) Butt. & Abbe	R. palustris (L.) Bess. ssp. hispida (Desv.) Jonsell	R. palustris (L.) Bess. ssp. hispida (Desv.) Jonsell
Ribes sativum (Reichenb.) Syme	R. rubrum L. var. alaskanum (Berger) Boivin	
Heuchera parviflora Bartl. rugelii (Shuttlw.) Rosend., Butt. & Lackey	H. parviflora Bartl.	

I	II	III
Prunus americana Marsh. var. lanata Sudw.	P. nigra Ait.	P. nigra Ait.
Prunus susquehanae Willd.	P. pumila L. var. susquehanae (Willd.) Jaeger	P. pumila L. var. susquehanae (Willd.) Jaeger
Amelanchier interior Nielsen	A. Xwiegandii Nielsen	A. Xwiegandii Nielsen
Amelanchier laevis Wieg.	A. arborea (Michx. f.) Fern. var. laevis (Wieg.) Ahles	A. arborea (Michx. f.) Fern. var. laevis (Wieg.) Ahles
Amelanchier humilis Wieg.		A. sanguinea (Pursh) DC.
Malus coronaria (L.) Mill. var. lancifolia Rehder	M. coronaria (L.) Mill. var. dasycalyx Rehder	?
Crataegus cuneiformis (Marsh.) Eggelst.	C. disperma Ashe	C. disperma Ashe
Synonym of C. cuneiformis (Marsh.) Eggelst.	C. pratensis Sarg.	?
Crataegus margaretta Ashe		C. chrysocarpa E.J. Palmer
Crataegus collina Chapm.	C. punctata (Ashe) E.J. Palmer	C. punctata (Ashe) E.J. Palmer
Synonym of C. collina Chapm.	C. Xlettermanii Sarg.	C. Xlettermanii Sarg.

I	II	III
Crataegus _hannibalensis_ E.J. Palmer	_C._ _crus-galli_ L.	_C._ _crus-galli_ L.
Crataegus _engelmannii_ Sarg.		_C._ _berberifolia_ Torr. & Gray
Crataegus _fecunda_ Sarg.		_C._ _berberifolia_ Torr. & Gray
Crataegus _acutifolia_ Sarg.	_C._ _crus-galli_ L.	_C._ _crus-galli_ L.
Crataegus _permixta_ Palmer	_C._ _crus-galli_ L.	_C._ _crus-galli_ L.
Synonym of _C._ _calpodendron_ (Ehrh.) Medic.	_C._ _Xwhittakeri_ Sarg.	_C._ _Xwhittakeri_ Sarg.
Synonym of _C._ _calpodendron_ (Ehrh.) Medic.	_C._ _chrysocarpa_ Ashe	_C._ _chrysocarpa_ Ashe
Crataegus _neobushii_ Sarg.	_C._ _intricata_ Lange	_C._ _intricata_ Lange
Synonym of _C._ _viridis_ L.	_C._ _ovata_ Sarg.	?
Crataegus _faxonii_ Sarg.		_C._ _chrysocarpa_ Ashe
Crataegus _tortilis_ Ashe	_C._ _schuettei_ Ashe	_C._ _coccinea_ L.
Synonym of _C._ _pruinosa_ (Wendl.) K. Koch	_C._ _dissona_ Sarg.	?
Crataegus _holmesiana_ Ashe		_C._ _coccinea_ L.
Synonym of _C._ _holmesiana_ Ashe	_C._ _biltmoreana_ Beadle	_C._ _intricata_ Lange

I	II	III
Synonym of C. holmesiana Ashe	C. intricata Lange	C. coccinea L.
Crataegus pedicellata Sarg.		C. coccinea L.
Crataegus pringlei Sarg.		C. coccinea L.
Crataegus corusca Sarg.		C. Xanomala Sarg.
Crataegus macrosperma Ashe		C. flabellata (Bosc) K. Koch
Rubus procerus P.J. Muell.	R. discolor Weihe & Nees	
Rubus occidualis Bailey	R. roribaccus (Bailey) Rydb.	R. roribaccus (Bailey) Rydb.
Synonym of R. flagellaris Willd.	R. baileyanus Britt.	R. baileyanus Britt.
Synonym of R. enslenii Tratt.	R. mundus Bailey	R. mundus Bailey
Rubus schneideri Bailey	R. missouricus Bailey	R. missouricus Bailey
Synonym of R. schneideri Bailey	R. wheeleri Bailey	R. wheeleri Bailey
Synonym of R. argutus Link	R. blakei Bailey	R. blakei Bailey
Synonym of R. argutus Link	R. abactus Bailey	R. abactus Bailey
Synonym of R. argutus Link	R. virilis Bailey	?
Synonym of R. argutus Link	R. ostryifolius Rydb.	R. ostryifolius Rydb.

I	II	III
Rubus avipes Bailey	R. pergratus Blanch.	R. pergratus Blanch.
Synonym of R. pensylvanicus Poir.	R. recurvans Blanch.	R. recurvans Blanch.
Synonym of R. pensylvanicus Poir.	R. bellobatus Bailey	R. bellobatus Bailey
Rosa pimpinellifolia L.	R. spinosissima L.	R. spinosissima L.
Rosa lunellii Greene	R. arkansana Porter var. suffulta (Greene) Cockerell	R. arkansana Porter
Rosa suffulta Greene	R. arkansana Porter var. suffulta (Greene) Cockerell	R. arkansana Porter
Potentilla millegrana Engelm.	P. rivalis Nutt.	
Fragaria americana (Porter) Britt.	F. vesca L. ssp. americana (Porter) Staudt	F. vesca L. ssp. americana (Porter) Staudt
Gillenia stipulata (Muhl.) Baill.	Porteranthus stipulatus (Muhl.) Britt.	Porteranthus stipulatus (Muhl.) Britt.
Geum strictum Ait.	G. aleppicum Jacq.	G. aleppicum Jacq.

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A GUIDE TO THE GOLDENRODS OF ILLINOIS[1]

Robert H. Mohlenbrock[2]

Probably no group of flowering plants in the midwest is brought to mind more quickly by the mention of autumn than goldenrods. The yellow displayed by goldenrods can be seen in fields, in prairies, in dry, rocky woods, in rich forested ravines, along backroads, and even around marshes and swamps.

Goldenrods sometimes evoke distasteful thoughts. The coarse growth form of some of them and their tendency to invade old fields and roadsides give them a weedy reputation, but every goldenrod in Illinois except for one rarely encountered species is native to the state. Many people blame goldenrods for their hayfever in autumn, but this again is a bad rap. Goldenrods are mostly self-pollinated, which means that there is a minimal chance for pollen to escape from the flowers to be blown about by the wind. The reason for goldenrod's bad reputation as a hayfever plant is that it blooms at the same time as the notorious ragweeds. Since the flowers of the ragweeds are inconspicuous, one has the tendency, when hayfever strikes, to look outside, note the showy goldenrods in flower, and lay the blame on these plants.

Goldenrods are placed in the genus Solidago and are members of the aster family. The latin name for the genus means "to make solid," or "to make whole," alluding to the medicinal properties attributed to some of the species. There are more than 100 different kinds of goldenrods in the world, with most of them native to the eastern United States. Thirty-two different ones have been found in Illinois.

Botanists and other wildflower enthusiasts often shudder at the thought of trying to identify a goldenrod to the species level. I must admit that some of them are difficult to identify. This

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[1]Reprinted in its entirety from ILLINOIS AUDUBON, Summer, 1985.
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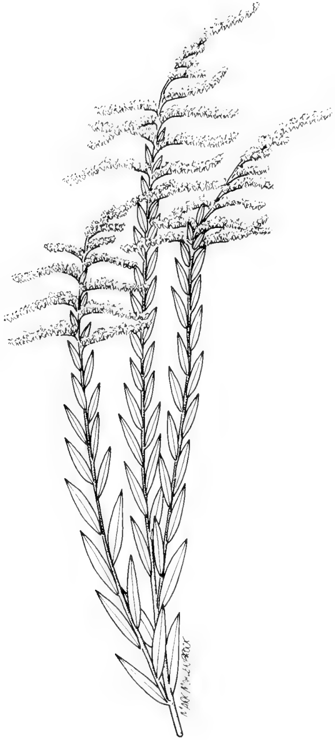

Fig. 1. Solidago canadensis var. hargeri. Illustration by Mark W. Mohlenbrock

is due in part to the fact that several species of goldenrods are known to hybridize, and intermediate forms are not uncommon to find in Illinois. A second fact is that some of the species are not clearly defined, and there is intergradation among closely related species.

Most goldenrods, however, can be identified, if careful observations are made of the arrangement of the flower clusters, the degree of hairiness of both the upper and lower parts of the stem, and of the nature of the leaves, particularly those that occur near the base of the stem. In some of the species more difficult to recognize, it may be necessary to examine the characteristics of the fruit.

Each individual goldenrod head, which to many looks like a miniature yellow daisy, is actually a small group of crowded flowers. Each of the little structures which appears to be a petal is considered to be a separate flower, known as a ray flower. If it were to be examined closely, it would be seen to have a slender pistil at its base, indicating that it is a pistillate flower. The ray flowers do not form pollen-producing stamens.

The few ray flowers in a head surround a tiny central area known as the disk. The disk is of a similar yellow color and is made up of a few flowers of a different shape, called the disk flowers. These disk flowers do not have a conspicuous yellow petal-like ray; instead, each disk flower is a tiny tubular structure at the base of which are stamens and a pistil. Because of this, the disk flowers are said to be perfect.

On the outside of each little head, near the base, is a series of narrow greenish structures called bracts. There are several of them, and they are crowded together in two or three rows. It is sometimes necessary to examine the nature of these bracts during the identification process.

Many heads are arranged together in goldenrods, usually resulting in a showy mass of flowers. Sometimes these masses of yellow heads are arranged in elongated sprays, known as racemes or panicles, and are formed at the upper end of the plant. Other species of goldenrods have their flowering heads arranged in a rounded or flat-topped cluster. Still others have small groups of flowers borne near the base of the leaves.

The fruit that develops from each pistil is small, slender, dark

hard, and either smooth or hairy. It is known as an achene. Attached to its upper tip is a small tuft of soft, white bristles, the pappus, which enables the seed to be air-borne by wind currents.

Let us discuss first the goldenrods whose heads are arranged in broadly rounded, or flat-topped, clusters. These may be further subdivided into two types, those with slender, narrow leaves rarely more than one-half inch broad, and those with leaves mostly broader than one-half inch. There are four species of round-topped, very narrow-leaved species.

One of them, Solidago ptarmicoides, has white flowers and is the subject of debate among botanists, some of whom classify it as an Aster. It does, in fact, have some features that are aster-like, and some that are goldenrod-like. Today the general concensus is that it is a goldenrod, and that is how I treat it. It lives in dry, sandy soil and has only been found in the northern half of the state.

The other three species of goldenrods with very narrow leaves and rounded flower clusters have yellow flowers and are known as grass-leaved goldenrods. Their narrow leaves give them a slender appearance, and they do not remind most people of good typical goldenrods. In fact, they do differ in several characteristics from other goldenrods, and some botanists have actually segregated them into their own genus Euthamia. In my new Guide to the Vascular Flora of Illinois, to be released by the Southern Illinois University Press next April, I do indeed recognize Euthamia, and attribute three species to it in Illinois. One is Euthamia graminifolia, a species found in moist soil throughout Illinois. It differs from the other two Euthamias in that its leaves have 3 or 5 veins.

The other two grass-leaved goldenrods, which have only one main vein per leaf, are much less common in the state. Euthamia tenuifolia is found mostly in sandy soil along Lake Michigan. Each individual flower head is less than one-fourth inch high. The other Euthamia, E. gymnospermoides, also grows in sandy soil, but it is more widespread in the central and northern counties of the state. Its flower heads measure more than one-fourth inch tall.

There are three round-topped species that still are kept in the genus Solidago. Solidago rigida, the rigid goldenrod, differs from the others by its middle and upper leaves that are usually

nearly as broad as long and as rough as sandpaper to the touch. This is a common inhabitant of prairies, and is found throughout Illinois except for the southernmost tip. Riddell's goldenrod, Solidago riddellii, is an interesting species in that its long, narrow leaves are usually folded together lengthwise. In addition, there is not a trace of any teeth on the edges of the leaves. It is found in moist soil mostly in the northern half of Illinois, although it also occurs today in Macoupin County, and at one time it was found in St. Clair and Wabash counties. Somewhat similar is Solidago ohiensis, the Ohio goldenrod, but its slender leaves are not folded together lengthwise, and there usually are a few tiny teeth along the edges of the leaves. This species is confined to moist soil around Chicago and Peoria.

The remaining 25 kinds of goldenrods have their flower heads either in elongated clusters or nestled at the base of the leaves. These can also be divided immediately into two groups. One of these groups has the flower heads in elongated, arching or drooping clusters with the heads all on one side of the branches. The other group has the flower heads either in upright elongated clusters or in small groups in the axils of the leaves.

The goldenrods with the elongated, arching or drooping clusters are the ones probably most familiar to Illinoisans and are likely to be the stereotypes for goldenrods. These species are the ones usually observed because they are common in fields, in woods, and along roads.

One of those with nodding flower clusters is not native in Illinois but was found growing once in the Chicago area. It is the seaside goldenrod, Solidago sempervirens, and differs from all the rest by its rather fleshy leaves. Another easy species to recognize is Solidago sphacelata, which has heart-shaped basal leaves. Illinoisans will have to go to the river bluffs along the Ohio River in Pope and Hardin counties to see this lovely species, because that is the only place it grows in the state.

For the remainder of the nodding goldenrods, it is necessary when you see the plants to observe whether the lowermost leaves are larger or smaller than the leaves on the middle part of the stem. If the lower leaves are the larger, then we are dealing with one of the following goldenrods in Illinois: Solidago nemoralis, S. patula, S. juncea, S. missouriensis, S. arguta, S. boottii, S. strigosa, S. neurolepis, and S. ulmifolia. In the first four of these, the lower leaves gradually taper into the petiole. Of

these, Solidago nemoralis, the field goldenrod, has its stems and leaves completely covered with very short, grayish hairs. This is one of the most common goldenrods in Illinois, and will be one of the most frequently encountered whether you are in fields, dry woods, or simply driving along country lanes. Solidago patula, the spreading goldenrod, usually has hairs on only the lower part of the stem, but its best identifying feature is its sandpapery leaves. This species grows in very wet soils, and even in marshes, in almost all of Illinois except the northwestern counties.

Solidago juncea and S. missouriensis are similar in having smooth leaves and stems, but the leaves of S. juncea usually have only one main vein, while the leaves of S. missouriensis have 3 strong veins. Solidago juncea is called the early goldenrod, because it is usually the first goldenrod to bloom in Illinois, sometimes as early as Memorial Day. It is found in fields, in woods, and along roads throughout the state. Solidago missouriensis is a species of prairies and dry open woods found throughout all of Illinois.

The five species of goldenrods in Illinois which have large basal leaves that are abruptly narrowed to the petioles are probably the most difficult of all goldenrods to distinguish in the state. The first thing to do is to check the mature achenes. If they do not have hairs, the plant is Solidago arguta, a species confined to dry, rocky woods in Jackson and Union counties. Check next to see if there is a rosette of leaves around the base of the plant. If there is no basal rosette, the plant is the common statewide woodland elm-leaved goldenrod, Solidago ulmifolia. Of the three goldenrods with basal rosettes, Boott's goldenrod, Solidago boottii, lacks elongated hairs on the veins of the lower leaf surface. Boott's goldenrod is known only from cherty wooded slopes in Union County. The remaining species, Solidago neurolepis and S. strigosa, have hairy veins and are rare species that grow in dry, rocky woods in Jackson and Union counties. The former species has tiny achenes less than 1/10 inch long, while the achenes of S. strigosa are more than 1/10 inch long.

There are five Illinois goldenrods that have arching or nodding clusters of flowers and leaves on the mid-part of the stem larger than those at the base of the stem. The rough-leaved goldenrod, Solidago rugosa, is the only one of these five that does not have three conspicuous veins on its larger leaves; its leaves only have a single main vein. The rough-leaved goldenrod is confined to the southern half of the state where it grows in moist soil.

Next check to see if the stems below the flower cluster are hairy. If the stems are smooth, the plant is Solidago gigantea, the late goldenrod. This species grows in moist soil throughout all of Illinois. We are now down to three species--Solidago altissima, S. drummondii, and S. radula. Solidago altissima, the tall goldenrod, probably the most common goldenrod in the state, has relatively narrow leaves, most of them more than four times longer than broad. The other two have broader leaves. Drummond's goldenrod, Solidago drummondii, grows only on exposed limestone bluffs along the Illinois and Mississippi rivers. Most of its leaves have distinct petioles. None of the leaves on the middle part of the stem of S. radula has a leaf stalk. This species occurs in dry open woods in some of the western and southern counties of the state.

Let us now discuss the nine species of Illinois goldenrods that have upright flower clusters and/or flower clusters confined to the axils of the leaves. Again we must check to see if the leaves near the base of the plant are larger or smaller than the leaves at the mid-part of the stem. Of those species with the lower leaves the larger, Solidago uliginosa, the swamp goldenrod, is very distinctive because of its long, narrow leaves that are at least five times longer than broad. This species of swamps and bogs is confined to the northern half of the state.

The most unique of this group of species is the silverrod, Solidago bicolor, whose flowers are silver or cream colored, rather than yellow. It is a species of dry open woods. It has been found from one end of the state to the other, but it is not a common plant. To distinguish Solidago sciaphila, S. hispida, and S. speciosa, first check the achenes. If they are not hairy, the goldenrod is Solidago sciaphila, a rare species confined to limestone cliffs in Carroll, JoDaviess, LaSalle, and Ogle counties. Solidago hispida and S. speciosa, both species with hairy achenes, differ by the hairy stems of S. hispida and the nearly smooth stems of S. speciosa. Solidago hispida, the hispid goldenrod, is found in dry, open woods in Jackson, Union, and Alexander counties. Solidago speciosa, the showy goldenrod, lives in woods and prairies throughout the state.

We are left with the four species of goldenrods that have axillary clusters of flowers and whose lower leaves are smaller than the middle leaves. Woodland goldenrod, Solidago caesia, and broad-leaved goldenrod, S. flexicaulis, species with smooth stems and hairy achenes, both live in moist, shaded woodlands and are found

in most parts of Illinois. The woodland goldenrod has narrow leaves essentially without petioles, while the broadleaved goldenrod has broad leaves that have well developed petioles. Solidago buckleyi and S. petiolaris have hairy stems and smooth achenes. They both live in dry, open woods and only in the southern one-fourth of the state. Buckley's goldenrod has relatively thin, sharply toothed leaves, while the leaves of S. petiolaris are thicker and have few teeth.

Autumn is the season for goldenrods. Next time you are out, try your hand at identifying them. You will soon find that they don't all look alike.

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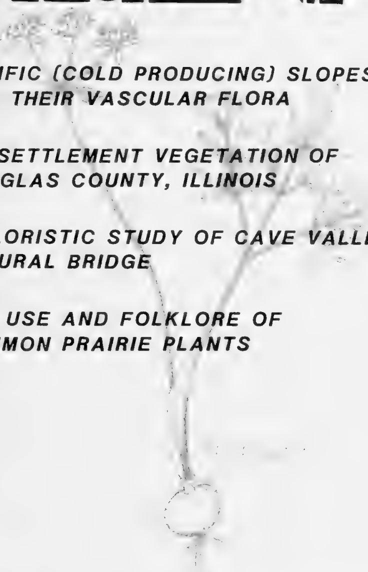

- *ALGIFIC (COLD PRODUCING) SLOPES IN ILLINOIS AND THEIR VASCULAR FLORA*
- *PRESETTLEMENT VEGETATION OF DOUGLAS COUNTY, ILLINOIS*
- *A FLORISTIC STUDY OF CAVE VALLEY/POMONA NATURAL BRIDGE*
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ALGIFIC (COLD PRODUCING) SLOPES IN ILLINOIS AND THEIR VASCULAR FLORA

by

John E. Schwegman[1]

Algific slopes are cold producing talus slopes that retain subsurface ice through most of the summer. Refrigerated air draining from ice retaining crevices in the talus, and sometimes from "ice caves" in an adjoining buff, create a cold microclimate on the surface of the slope. Such slopes in the upper midwest frequently support relict northern and Pleistocene biota.

The term algific was coined by Frest (1981) and is adopted here. Thorne (1964) referred to these habitats as shaded north-facing talus slopes and Lammers (1983) as boreal slopes. A famous occurrence of this habitat in West Virginia is referred to as Ice Mountain by Hayden (1843). Mark Twain (1872) in "Roughing It" describes "natural icehouses" in talus along his stage route west through Utah.

Much attention has been focused on the midwest algific slopes in recent years with the development of natural area preservation programs and the realization that many endangered species inhabit them. Perhaps the most notable endangered species restricted to them is the Iowa Pleistocene Snail *(Discus maclintockii)*. Field work associated with determining the status of this animal, as summarized by Frest (1984), greatly expanded the knowledge of algific slopes in Iowa including the development of theories on their origin and development. One of the most notable plants on them is the Northern monkshood *(Aconitum noveboracense)*. The snail and monkshood are listed under federal law as endangered and threatened species respectively.

Algific slopes in the upper midwest are associated with the so called "Wisconsin Driftless Area" of Wisconsin, Iowa, Minnesota and Illinois which has escaped recent glaciation. They occur only in areas of well dissected topography with significant rock exposure and recent proximity to a continental ice sheet (Frest, 1984).

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Such proximity produces periglacial conditions in an otherwise temperate locale. Periglacial effects include creation of a fractured mechanical karst in the outcrop and an abundance of talus, both resulting from ice wedging and ice breakdown of rock. Thus the slopes owe their physical structure to recent Pleistocene glaciation even though they were not directly covered by the ice sheet.

Most midwestern algific slopes are developed in large porous carbonate rock units that cap eroded slopes and are underlain by a unit relatively impervious to ground water flow (Frest, 1984). These are Ordovican and Silurian limestones and dolomites. While sandstone units are present in the "Driftless Area" they have not developed algific slopes. However, the Ice Mountain of West Virginia is developed in sandstone (Hayden, 1843). All known algific slopes have a northerly exposure.

The role of groundwater in ice and climate modification on the slopes is uncertain. Hayden (1843) noted that the summer temperature of spring water emanating from the Ice Mountain talus was the same (52° F) as other springs in the county. This is considerably warmer than the air temperature on the slope of less than 40° F. Thorne (1964) attributes a cooling effect to seepage water flowing from crevices in the limestone at White Pine Hollow, Iowa. If so it is probably melt water from ice in the relatively shallowly fractured bedrock and not ground water at the mean temperature of the area. He gives no temperature for the water. Ground water probably contributes to ice build up in some slopes along with winter and spring precipitation. I have never seen water flowing from any of the algific slopes I have visited.

Soil on midwest algific slopes is apparently derived from loess and residuum and because of greater loess depth, probably averages deeper on Illinois slopes than on those west of the Mississippi River. Some Illinois slopes have very thin soil and are rocky while others have soil at least 15 cm deep on parts of the talus. This soil is very dark and organic rich as compared to forest soils on adjacent slopes. The extreme cold of some slopes appears to retard organic decomposition creating a unique upland high-organic soil.

I discovered the first algific slope in Illinois (Asgard) north of Blanding Landing in JoDaviess County in the spring of 1981

(Schwegman 1982). In the late autumn of 1982, Mr. Randy Nyboer and I flew an aerial survey of the Illinois part of the Driftless Area searching for talus deposits. Field visits were made during the following summer to determine which talus areas were algific. A total of 8 new slopes were discovered, but only one was as strongly developed as Asgard and it had been greatly disturbed by grazing cattle. All were within two miles of Asgard except 2 small areas on bluffs of the Galena River north of Galena and one on the Sinsinawa River.

After determining that the Asgard site was almost certainly the largest, coldest and least disturbed algific slope in Illinois, it seemed appropriate to describe its environment, vegetation and vascular plant species. To this end, I visited the slope April 25, June 5, July 30 and September 25, 1985. Plant species were listed on all trips and temperature slope and aspect observations were made July 30. Voucher specimens were collected for some of the more notable and confusing species. These are housed in the Botany Program herbarium of the Department of Conservation.

The Asgard slope is 200 feet above and 500 feet east of the Mississippi River in the SE¼ of Sect 28, T27N, R1E, JoDaviess County, Illinois. It faces west-northwest with a 35° slope. The talus is below a 30 foot high cliff of limestone between elevations 800 and 870 feet. The talus rests on a strata of limestone that forms a "bench" extending some 30 feet west of its base in most places. At one point a small algific slope extends below the "bench". The slope is 300 feet long at its base but narrows toward the top. Talus rocks in the middle and upper slope average under 3 feet in diameter, but some large boulders occur along the base of the slope. The species list is for the talus slope including the large basal boulders and the adjoining "bench".

Temperature measurements were taken on July 30, 1985 at Asgard and two other nearby slopes. At Asgard the surface temperature at lower slope sites supporting relict northern plants was 42° F at 2 PM while the air temperature away from the slope was 65° F. At 25 cm down in the talus the temperature was 33° F indicating ice nearby. One of the other sites had temperatures as cold as Asgard but had been disturbed by grazing. The other slope had a cool 50° F, but not cold, surface reading. The cold air flows down the slope in a layer no more than 6 to 8 inches deep.

In addition to its impact on organic soil formation, the cold temperature probably alters the structure of the vegetation and the form of some plants. It definitely alters the flowering phenology of plants.

At Asgard the main slope is essentially devoid of trees apparently due to persistent cold at the rooting depths required for tree growth. The occasional paper birch *(Betula papyrifera)* and black Ash *(Fraxinus nigra)* on the slope probably occur on warm spots or areas of deeper surface soil. The slope is mostly dominated by herbs and mosses rooted in the soil on the surface of the talus.

An unusual form of *Lysimachia ciliata* with dwarf leaves grows at Asgard. This form may be due to cold-related growth retardation.

The cold affects flowering phenology by extending the flowering season for some plants. This effect apparently stems from slowed metabolism and is most pronounced in low herbs that scarcely rise above the 6 to 8 inch deep cold air layer. Spring flowering herbs such as *Arabis Lyrata, Campanula rotundifolia* and *Viola canadensis* bloomed all summer and were still in flower on the September 25 visit. *Aquilegia canadensis* and *Heuchera richardsonii* were still blooming on July 30.

The effect of the cold on vegetative recovery from soil disturbance is unknown. At the cold slope which appears to have been disturbed by cattle, patches 3 to 4 feet across are dominated by liverworts of the genus *Marchantia*. These are extremely cold spots that may be too cold for the typical *Cystopteris bulbifera* cover to survive. However, since cold patches at Asgard do not support similar liverwort communities, I interpret them as successional stages of recovery from past soil disturbance. Recovery appears to be very slow.

Vegetation on the Asgard slope is remarkable for its openness with no complete tree canopy or shrub cover. The slope is dominated by *Cystopteris bulbifera, Polymnia canadensis & Impatiens biflora* with scattered *Betula papyrifera* and *Fraxinus nigra* trees and clumps of *Cornus rugosa*. Most of the relict northern plants grow near the base of the slope, especially at its north end. Large boulders along the base of the slope support *Physocarpus opulifolius, Ribes cynosbati, Aralia nudicaulis* and other mesophytic species. The "bench" at the base of the

slope, which is influenced by cold air drainage from the slope, supports a forest of oaks and sugar maple *Acer saccharum* with an understory including *Cornus rugosa* and a diverse herb layer containing an abundance of *Viola canadensis*.

The following list includes 116 species of vascular plants which I have recorded for the Asgard slope. The taxonomy and sequence of families follows Mohlenbrock (1975). The species are listed alphabetically within families. Abundance is indicated as rare (less than 10 plants observed), local (abundant in part of suitable habitat) and common (abundant throughout its habitat).

Equisitaceae

Equisetum arvense. Local in lower talus slope, a forking branched variety.

Ophioglossaceae

Botrychium virginianum. Local at base of slope

Polypodiaceae

Asplenium rhizophyllum.	Local on boulders at base of slope.
Cryptogramma stelleri.	Local on cold rocks at base of slope.
Cystopteris bulbifera.	Common and dominant on open slope.
Cystopteris fragilis.	Local in rock crevices.
Pellaea glabella.	Local on cliffs at top of slope.

Cupressaceae

Juniperus virginiana.	Local on lower algific slope and on cliffs above main slope.

Poaceae

Andropogon gerardii.	Rare at base of slope.
Festuca obtusa.	Local on slope and at base of slope.
Oryzopsis racemosa.	Local on slope.
Poa compressa.	Local on boulders and slope.
Poa palustris.	Local on slope.
Poa pratensis.	Local on slope
Sphenopholis obtusata.	Common at base of slope.

Cyperaceae

Carex artitecta.	Local on boulders at base of slope.
Carex eburnea.	Local on rocks and slopes.
Carex rosea.	Rare at the base of the slope.
Carex sprengelii.	Local at base of slope.

Liliaceae

Maianthemum canadense.	Rare in cold spot at base of slope.
Polygonatum commutatum.	Local at base of slope.
Smilacina raceomosa.	Local at base of slope.
Uvularia grandiflora.	Local at base of slope.

Smilacaceae	
Simlax ecirrata.	Rare at base of slope.
Dioscoreaceae	
Dioscorea villosa.	Rare at base of slope.
Orchidaceae	
Orchis spectabilis.	Rare at base of slope.
Juglandaceae	
Juglans cinerea.	A large specimen at base of slope.
Betulaceae	
Betula papyrifera.	Common on slope and in adjacent woods.
Corylus cornuta.	Rare on the lower part of slope & north end.
Ostrya virginiana.	Local on lower part of slope.
Fagaceae	
Quercus muhlenbergii.	Local at base of slope.
Quercus rubra.	Local at base of slope.
Ulmaceae	
Ulmus rubra.	Local at base of slope.
Urticaceae	
Parietaria pensylvanica.	Local on tops of boulders
Pilea Pumila.	Local on talus on the slope.
Polygonaceae	
Polygonum scandens.	Local on the slope and in adjacent woods.
Chenopodiaceae	
Chenopodium gigantospermum.	Rare in and along the upper north edge of slope.
Chenopodium standleyanum.	Rare on the slope.
Ranunculaceae	
Actaea rubra.	Rare on lower slope.
Anemone virginiana.	Local on boulders at base of slope.
Aquilegia canadensis.	Common on boulders and along lower edge of slope.
Clematis verticillaris.	Local along lower edge and base of slope.
Hepatica nobilis var acuta.	Local at base of slope.

Menispermaceae	
Menispermum canadense.	Local at base of slope.
Papaveraceae	
Dicentra cucullaria.	Local at base of slope.
Sanguinaria canadensis.	Local at base of slope.
Cruiferae	
Arabis lyrata.	Common on lower part of slope.
Erysimum cheiranthoides L.	Local at lower north end of slope.
Saxifragaceae	
Heuchera richardsonii.	Local on the slope.
Ribes cynosbati.	Common at base of slope.
Rosaceae	
Amelanchier interior.	Local on lower slope at north end.
Fragaria americana.	Local on lower part of slope.
Physocarpus opulifolius.	Local on boulders at base of slope.
Prunus virginiana.	Common at base of slope.
Rosa acicularis.	Local on lower part of slope and in cold pockets at base of slope.
Rubus occidentalis.	Local on slope and at its base.
Leguminosae	
Amphicarpa bracteata.	Local at edge of slope.
Desmodium glutinosum.	Common at base of slope.
Oxalidaceae	
Oxalis stricta.	Rare in a boulder crevice at edge of slope.
Rutaceae	
Xanthoxylum americanum.	Local at base of slope.
Anacardiaceae	
Rhus glabra.	Rare on the lower part of the slope.
Toxicodendron radicans.	Common at the base of the slope.
Celastraceae	
Celastrus scandens.	Rare at base of slope.
Euonymus atropurpureus.	Rare on a boulder at base of slope.

Staphyleaceae

Staphylea trifolia.	Local at base of slope.

Aceraceae

Acer saccharum.	Local along edge of slope.

Balsaminaceae

Impatiens biflora.	Common on the slope.

Vitaceae

Parthenocissus vitacea.	Local on the north end of the slope
Parthenocissus quinquefolia.	Local at base of slope.
Vitis riparia.	Rare on a boulder at base of slope.

Tiliaceae

Tilia americana	Local on the slope.

Violaceae

Viola canadensis.	Common on the lower slope and at the base of the slope.
Viola pratincola.	A single sterile specimen on the slope.
Viola sororia.	Local at base of the slope.

Onagraceae

Circaea quadrisulcata.	Local at base of slope.

Araliaceae

Aralia nudicaulis.	Local on the lower slope.
Aralia racemosa.	Rare on lower slope.

Unbelliferae

Osmorhiza claytoni.	Local at base of slope.

Cornaceae

Cornus alternifolia.	Local at base of slope.
Cornus racemosa	Rare at base of slope
Cornus rugosa.	Common on slope and local at its base.

Primulaceae

Lysimachia ciliata.	Rare dwarf-leaved specimen on the slope.

Oleaceae

Fraxinus americana.	Local at base of slope.
Fraxinus nigra.	Local on the slope.

Apocynaceae	
Apocynum cannabinum.	Local at base of slope.
Convolvulaceae	
Calystegia sepium.	Local on the slope.
Hydrophyllaceae	
Hydrophyllum virginianum.	Local at base of slope.
Phrymaceae	
Phryma leptostachya.	Local at base of slope.
Labiatae	
Monarda fistulosa.	Rare on a boulder at base of slope.
Stachys tenuifolia.	Rare at base of slope.
Solanaceae	
Solanum americanum.	Rare in a crevice of boulder at south edge of slope.
Scrophulariaceae	
Veronicastrum virginicum.	Rare on lower slope.
Orobanchaceae	
Orobanche uniflora.	Rare on a large talus stone on lower part of slope.
Rubiaceae	
Galium boreale.	Local on lower half of slope.
Galium concinnum.	Local at base of slope.
Caprifoliaceae	
Lonicera prolifera.	Rare on boulder at base of slope.
Viburnum lentago.	Local on slope.
Viburnum rafinesquianum	Local along lower slope at north end.
Viburnum trilobum.	Rare on lower slope at north end.
Campanulaceae	
Campanula americana	Local at base of slope.
Campanula rotundifolia.	Local on lower slopes and on rock ledges at its base.

Compositae	
Aster sagittifolius.	Local on talus on lower slope.
Aster shortii.	Common at base of slope.
Cacalia atriplicifolia.	Rare at base of slope.
Erigeron philadelphicus.	Rare on lower slope.
Eupatorium rugosum.	Local around edges of slope.
Helianthus divaricatus.	Rare at base of slope.
Helianthus strumosus.	Rare at base of slope.
Heliopsis helianthoides.	Rare at base of slope.
Polymnia canadensis.	Common on talus slope.
Prenanthes alba.	Rare on talus at north end.
Rudbeckia hirta.	Local in cold area at base of slope.
Solidago canadensis.	Local along base of slope.
Solidago felxicaulis	Common along base of slope.
Solidago sciaphila.	Local in cold area at base of slope.
Solidago ulmifolia.	Local on boulders and at base of slope.
Taraxicum officinale.	Local on boulders at base of slope.

The following plants were observed on other algific slopes in Illinois but were not present at Asgard.

Equisetum pratense	Rare on one slope near Asgard.
Taxus canadensis.	Local on slopes along Galena & Sinsinawa Rivs.
Arabis hirsuta.	Rare on the disturbed slope near Asgard.
Rubus strigosus.	Rare on the Sinsinawa River slope.
Circaea alpina.	Local on slopes along the Galena River.

Another species reported from a small perched algific slope along Carroll Creek in Carroll County is *Gymnocarpium robertianum*. I have not seen this population or a voucher specimen from it however.

Acknowledgements

I wish to thank Mr. Randy Nyboer for assistance in searching for algific slopes and gathering temperature data.

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PRESETTLEMENT VEGETATION OF DOUGLAS COUNTY, ILLINOIS

John E. Ebinger

The original land survey notes have occasionally been used to reconstruct presettlement vegetation, and according to Bourdo (1956) this information, when used in conjunction with non-survey sources of information, provides a good picture of the vegetation prior to settlement. In Illinois the extent of prairie has been determined using this material (Anderson, 1970), as well as the presettlement vegetation of both Lake County (Moran, 1976), and Kane County (Kilburn, 1959).

In the present study the presettlement vegetation of Douglas County, Illinois was reconstructed using the General Land Office Survey notes. Douglas County is located in east-central Illinois (88° 15′ W, 39° 50′ N) in the southern part of the Grand Prairie Section of the Grand Prairie Division of Illinois (Schwegman, 1973). The county has an area of 420 square miles, and the topography, for the most part, is flat to gently rolling due to ground moraine and low recessional moraine deposits resulting from Wisconsin glaciation. Two river systems traverse the county, the Embarras River in the eastern half, and the Kaskaskia River in the west. Both form relatively shallow valleys since down-cutting has only occurred since the last glaciation (16,000 years), and both rivers originated just to the north of Douglas County. The first settlement in Douglas County was established in 1829 (Hallbick and Fehrenbacher, 1971). Thus the vegetation present when the county was surveyed in 1821 and 1822 was not greatly changed by European man.

Microfilms of the General Land Office Survey notes were examined as were the original survey notes and plats at the Illinois State Archives, Springfield, Illinois. The job of the surveyor was to establish a grid system of township, range, and section lines by the placement of section and quarter section corner posts. In prairie and marsh areas only posts were used, while in timbered areas two witness trees were blazed and the distance and direction of these trees from the corner posts, the species, and dbh recorded. At the end of each mile the surveyor described the predominant vegetation encountered, and after surveying a township, a plat map was drawn from the field notes. These maps show the distribution of prairie, timber, lakes, streams, marshes, and other natural features.

From the surveyor's notes the number, size (dbh), species, and distance and direction from the corner posts were recorded for all witness trees. Also, the species and size (dbh) of all line trees as well as all notes concerning the vegetation were recorded. From these data the total individuals, total basal area (sq. ft.), average diameter, average distance to corner posts, relative density, relative dominance, and Importance Values (IV) were calculated. Frequency was computed by considering the witness trees at each corner post as comparable to a quadrat in which only two trees are present (Cottom and Curtis, 1949). The calculation of the IV follows the procedure outlined by McIntosh (1957) in which the IV is the sum of the relative density and the relative dominance.

The information from the surveyor's notes and plat maps, along with soil (Hallbick and Fehrenbacher, 1971) and topographic maps were then used to determine the extent of prairie and forest in the county (figure 1). As the surveyors accurately noted the point along the section lines where they entered another vegetation type the construction of the map was not difficult.

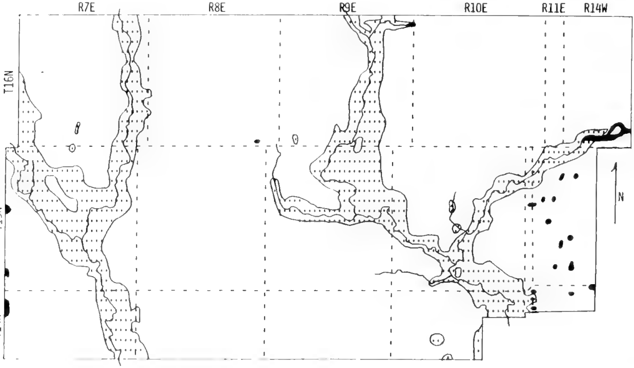

FIGURE 1. PRESETTLEMENT VEGETATION OF DOUGLAS COUNTY, ILLINOIS SHOWING THE DISTRIBUTION OF PRAIRIE [ ] AND FOREST [ ]. ALSO SHOWN ARE THE PONDS AND LAKES [ ] RECORDED IN THE ORIGINAL SURVEY.

Also, if the corner was in forest, witness trees were usually recorded, and if the corner was in prairie, it was so noted. However, since the interior of sections were not surveyed, small groves, small prairie inclusions in the forest, ponds, and other small natural features may not have been recorded.

A total of 13 species were listed as witness (tables 1 and 2) and line trees (table 3). The surveyor also used the collective names of hickory, elm, and ash. It is not possible to identify these to a particular taxa and all undoubtedly refer to two or more

Table 1. Total individuals, total basal areas, relative values, importance values, average diameters, average distance to corners, and frequencies for witness trees listed in the original land survey records for Douglas County, Illinois.

Common Name and Symbol	Total Ind.	Total Basal Area (sq. ft.)	Relative Density	Relative Dominance	Importance Value	Average Diameter (inches)	Average Distance to Corner (ft)	Frequency(%)
White Oak/WO	128	322.828	34.0	44.7	78.7	20.2	41.21	39
Hickory/Hi	77	88.329	20.4	12.2	32.6	14.1	36.95	28
Black Oak/BO	44	90.802	11.7	12.6	24.3	16.9	37.77	16
Elm/El	42	52.545	11.1	7.3	18.4	13.7	42.19	15
Black Walnut/BW	16	28.556	4.2	4.0	8.2	16.9	45.58	7
Silver Maple/SiM	10	25.096	2.7	3.5	6.2	15.5	28.31	4
Bur Oak/BuO	10	24.195	2.7	3.3	6.0	18.6	45.76	4
Red Oak/RO	12	16.080	3.1	2.2	5.3	15.1	182.88	5
Ash/As	12	13.118	3.1	1.8	4.9	13.7	25.74	5
Pin Oak/PiO	8	18.006	2.1	2.5	4.6	18.9	54.78	2
Sugar Maple/SuM	7	12.871	1.9	1.8	3.7	17.7	28.66	2
Sycamore/Sy	3	14.100	.8	2.0	2.8	29.3	46.86	1
Honey Locust/HL	3	10.233	.8	1.4	2.2	24.7	69.74	1
Red Mulberry/RM	3	2.841	.8	.4	1.2	13.0	32.34	1
Basswood/Ba	1	1.396	.3	.2	.5	16.0	51.48	1
Post Oak/PoO	1	.785	.3	.1	.4	12.0	67.98	1
Totals	377	721.781	100.0	100.0	200.0			

species. Also, since the surveyors listed only common names, some care was taken in assigning scientific names. For the most part little difficulty was encountered since the most abundant species are still common in woodlots throughout the county. Also, the probably scientific names correspond well with those of other authors, particularly Kilburn (1959) and Moran (1976). The only name which presented a problem was a few entries of Spanish oak. These were interpreted as pin oak (Quercus palustris Muenchh.). A few species that were not used as witness or line trees, were also recorded by the surveyors. These include hazel (Corylus americana), buckeye (Aesculus glabra), hackberry (Celtis occidentalis), sassafras (Sassafras albidum), redbud (Cercis canadensis), plum (Prunus sp.), spice (probably sassafras), briers (?), and vines(?).

Table 2. Witness tree diameter classes listed from the original land survey records for Douglas County, Illinois.

Symbol	Diameter Classes (in inches)																
	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38+
WO	-	2	10	12	9	6	24	19	3	18	4	2	9	3	2	3	2
Hi	2	4	10	19	17	6	11	5	3	-	-	-	-	-	-	-	-
BO	-	6	8	5	7	2	3	3	-	5	-	1	1	-	-	-	3
El	2	4	7	10	5	3	7	2	-	-	-	-	1	-	-	1	-
BW	-	2	2	3	-	-	2	3	-	3	-	-	1	-	-	-	-
SiM	1	-	1	1	2	-	1	1	-	1	-	-	-	-	-	2	-
BuO	-	-	-	1	1	-	4	3	-	-	-	-	-	-	-	-	1
RO	-	1	2	1	3	-	1	4	-	-	-	-	-	-	-	-	-
As	-	-	4	3	2	-	1	2	-	-	-	-	-	-	-	-	-
PiO	-	-	1	2	-	2	-	-	-	1	-	-	2	-	-	-	-
SuM	-	-	-	2	1	-	1	1	-	2	-	-	-	-	-	-	-
Sy	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-
HL	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-	-
RM	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Ba	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
PoO	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	5	19	46	61	47	21	55	44	6	31	4	4	17	3	2	6	6

A total of 1386 corners were surveyed in the county. Of this total 1175 were in prairie, while 211 were in forest. Of the corners in forest 171 had two witness trees listed, 35 had only one tree listed, while 5 had no trees listed. Prairie was the most widespread plant community, covering approximately 85% of the county, while forest communities, which were generally restricted to the major river systems, account for the remaining 15%. These are the only two plant communities listed by the surveyor.

Though prairie was the most common vegetation type in the county, little information concerning prairie vegetation is available in the surveyor´s notes. No prairie species are listed, and the most common comments are "gently rolling prairie, good soil"; "rolling prairie"; or "level wet prairie". This latter comment is used to describe the prairie areas in the extreme western part and the extreme southeastern part of the county where numerous shallow ponds and lakes were reported by the surveyors (figure 1). In general, prairie appears to be more extensive on the west side of both river systems. This pattern suggest that periodic fires restricted forest development to the protected eastern side of the rivers (Gleason, 1913).

A total of 377 witness trees (table 1) and 51 line trees (table 3) were recorded in the surveyor´s records for Douglas County. White oak is by far the most important species listed. Overall this species has an importance value of 78.7, an average diameter of 20.2 inches, and a frequency of 39% (table 1). The hickories as a species group are second in importance (IV of 32.6), followed by black oak (IV of 24.3), and elms (IV of 18.4). The remaining species all have importance values of less than 10, indicating their minor contribution in the presettlement forest. The most common surveyor´s comment of the forested areas near the rivers is "timberland poor, hilly, unfit for agriculture", while near the prairie-forest border the most common comments are "timber level, wet soil", or "mostly thinly timbered, land level to somewhat broken". The surveyors also list hazel as the common understory species, though sassafras, spice, brush, briers, and vines are common entries. Of the few prairie groves reported, the only surveyor´s comment was that the large grove in T14N R10E was a grove of hickories.

Table 3. Total individuals, total basal area, relative values, and average diameters for the line trees listed in the original land survey records for Douglas County, Illinois.

Symbol	Total Ind.	Total Basal Area (sq. ft.)	Relative Density	Relative Dominance	Importance Value	Average Diameter (inches)
WO	17	43.132	33.3	31.0	64.3	20.5
BO	11	46.444	21.5	33.4	54.9	26.1
El	8	16.976	15.6	12.2	27.8	19.0
Hi	8	8.780	15.6	6.3	21.9	14.0
BuO	1	11.540	2.0	8.3	10.3	46.0
BW	2	5.323	4.0	3.8	7.8	22.0
PiO	2	2.552	4.0	1.8	5.8	15.0
RO	1	2.181	2.0	1.6	3.6	20.0
As	1	2.181	2.0	1.6	3.6	20.0
TOTAL	51	139.109	100.0	100.0	200.0	

More than 70% of the witness trees recorded by the surveyors were between 10 and 21 inches dbh. Of the species recorded white oak is well represented in nearly all diameter classes (table 2), indicating its continued and high importance in the presettlement forest. Hickories, black oak, and elm are also well represented in the smaller and medium diameter classes, indicating their continued importance. This data must be used with caution, however, since witness tree selection was more or less arbitrary (Lutz, 1930). The surveyors commonly selected species that were durable and relatively easy to inscribe, also smaller trees were commonly not selected since the surface area needed to inscribe the blaze was too small, nor were large veteran trees due to their high mortality.

Due to the small number of witness trees, it was not possible to distinguish different forest types. However, the distribution of certain species indicate that different forest types did occur in the county. The presence of silver maple, sycamore, and honey locust indicate that floodplain and terrace forests occurred along the major river systems. Also bur oak, post oak, red oak, and pin oak were mostly reported at section corners near the prairie-forest border. In these areas the witness trees tended to average a greater distance from the corner posts than in most other forested areas, probably indicating a trend toward a more open, savannah type vegetation.

The composition of the presettlement forest is very similar to that of a forest surveyed by Ebinger, Phillippe, and Phillippe (1977) at Walnut Point State Park, Douglas County, Illinois. Though this forest has been subjected to past grazing and cutting, it represents the best remaining example of an upland, streamside forest in the upper part of the Embarras River watershed. In this forest white oak is the dominant species with an importance value of 65.65 (out of a possible 300), followed by black oak, pignut hickory, mockernut hickory, shagbark hickory, white ash, and red elm. Most of the remaining species listed were also found in the presettlement forests.

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A FLORISTIC STUDY OF CAVE VALLEY/POMONA NATURAL BRIDGE

Thomas Sadowski[1]

The Cave Valley/Pomona Natural Bridge area is located within the Cedar Creek/Cave Valley watershed of the Shawnee National Forest, Jackson County, Illinois. This diverse area is located approximately ten miles southwest of Carbondale, Illinois, and is included in sections 16, 17, 20, and 21, T10S, R2W. (Fig. 1). This heterogeneous area of both lowlands and uplands is 1.3 miles in a north-south direction and 1.5 miles in an east-west direction.

The Cave Valley/Pomona Natural Bridge area is included in the Shawnee Hills section of the Interior Low Plateau physiographic province of North America (Leighton et al., 1948). The Shawnee Hills section is characterized by a high east-west cuesta composed of resistant sandstone of the Pennsylvanian period (Harris et al., 1977). Schwegman (1973) segregated this section into the Greater and Lesser Shawnee Hills. The study area is included in the latter and is distinguished from the Greater Shawnee Hills in having hills of lower elevation and bedrock comprised of sandstone and limestone.

The action of streams, wind, and glaciation on the Pennsylvania strata formed the present topography. Of these, glacial outwash probably was the most influential weathering process (Desborough, 1960). The greatest elevation is 680 feet above mean sea level just south of the Natural Bridge in the SW1/4, sec. 17. (Fig. 1). The lowest elevation is 340 feet and is located in the Cedar Creek floodplain in the NW1/4, sec. 17. (Fig. 1). Differential erosion of a scarp trending northeast to southwest is responsible for this overall relief of 340 feet.

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The closely placed streams of the dendritic drainage pattern predominant in southern Illinois is characteristic of the area. Cave Creek, a tributary of Cedar Creek, forms the eastern boudary. The northwest boundary is formed by Cedar Creek, a tributary of the Big Muddy River. Additionally, three intermittent streams drain into these creeks.

Erosion of the uplifted substrate by Cedar Creek and Cave Creek formed the major valleys characterized by wide, flat floodplains with low gradients and meandering stream channels. The lowest elevations are found in these valleys.

Valleys formed by intermittent streams are of a different nature. The resistance of the sandstone has given rise to v-shaped valleys with gentle sloping sides. The most significant feature found in these lesser valleys is the Pomona Natural Bridge in the SW1/4, sec. 17 (Fig. 1). This monolithic bridge was formed by stream erosion hundreds of years ago when the stream was more active. The bridge spans 90 feet across a ravine 20 feet below (Mohlenbrock, 1973).

The Pomona Natural Bridge was cited for its well developed sandstone escarpments and bluffs, upland forest, and ravine communities (Voigt and Mohlenbrock, 1964). A description of each of these communities with emphasis on the corresponding plant assemblages was included. Two sites were designated as containing rare, endangered, or threatened biota in the Illinois Natural Areas Inventory (INAI), conducted for the Department of Conservation (K. Andrew West, District Biologist, Natural Heritage Program, Illinois Department of Conservation, pers. comm.). Areas containing rare, endangered, or threatened biota are classified by the INAI as Category II. One site designated as Category II is located in Cave Valley and supports a population of *Hottonia inflata* on the muddy edge of a pond. The second area cited as Category II wasn't visited by the INAI. This classification was based on a citing of the occurrence of the rare and endangered mint, *Synandra hispidula* near the Pomona Natural Bridge (Mohlenbrock, unpublished). Previous studies of the flora were of limited perspective. As a result, a complete and comprehensive plant list has never been compiled, nor have all the natural communities occurring in the area been described.

The following taxa have been collected from the Cave

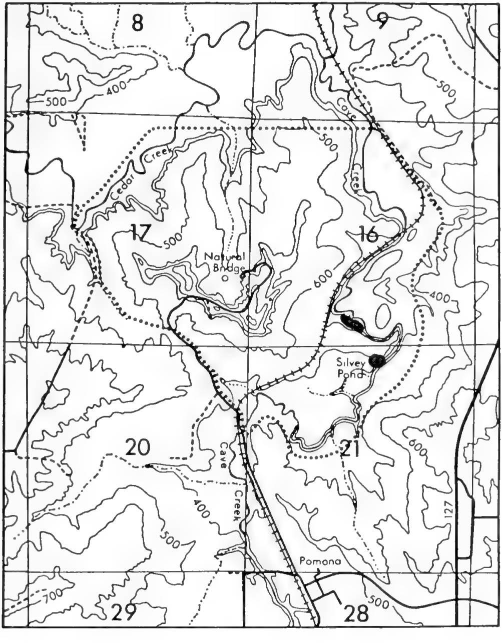

Figure 1. Topographic map of study area. Boundaries outlined by dotted line.

taxon. A list of all collection numbers is available by writing the Department of Botany, Southern Illinois University, Carbondale, Illinois 62901. A single asterisk (*) before the species indicates the taxon has been previously unreported from Jackson County, Illinois (Mohlenbrock and Ladd, 1978).

Nomenclature follows that of Mohlenbrock (1975) for taxa previously recorded in Illinois. Lactuca hirsuta and Lathyrus hirsuta were not known to occur in Illinois prior to the publication of Guide to the Vascular Flora of Illinois (Mohlenbrock, 1975). For these taxa, nomenclature follows that of Steyermark (1963).

ACANTHACEAE

Ruellia humilis Nutt. var. longiflora (Gray) Fern.; upland forest.
Ruellia pedunculata Torr.; mesic forest.
Ruellia strepens L.; floodplain forest.

ACERACEAE

Acer barbatum Michx.; mesic forest.
Acer negundo L.; wet floodplain forest.
Acer rubrum L.; upland forest.
Acer saccharinum L.; wet floodplain forest.
Acer saccharum Marsh.; mesic forest.

AIZOACEAE

Mollugo verticillatus L.; cultural, old field.

ALISMACEAE

Alisma subcordatum Raf.; cultural, game opening.

AMARANTHACEAE

Froelichia gracilis (Hook.) Moq.; cultural, railroad bed.

ANACARDIACEAE

Rhus aromatica Ait.; sandstone glade.
Rhus copallina L.; cultural, railroad bed.
Rhus glabra L.; cultural, game opening.
Toxicodendron radicans (L.) Kuntze.; cultural, trail.

ANNONACEAE

Asimina triloba (L.) Dunal.; mesic forest.

APOCYNACEAE

Apocynum cannabinum L.; cultural, game opening.
*Vinca major L.; cultural, pine plantation.

ARACEAE

Arisaema dracontium (L.) Schott.; mesic forest.
Arisaema triphyllum (L.) Schott.; mesic forest.

ARISTOLOCHIACEAE

Asarum canadense L.; mesic forest.

ARALIACEAE

Aralia spinosa L.; mesic forest.
Mertensia virginica (L.) Pers.; mesic forest (L.)
Myosotis virginica (L.) BSP.; cultural, trail.

CACTACEAE

Opuntia compressa (Salisb.) Macbr.; sandstone glade.

CAMPANULACEAE

Campanula americana L.; floodplain forest.
Lobelia inflata L.; cultural, roadside ditch.
Lobelia siphilitica L.; mesic forest.
Specularia biflora (R. & P.) Fisch. & May.; upland forest.
Specularia perfoliata (L.) A. DC.; cultural.

CAPPARIDACEAE

Polanisia dodecandra (L.) DC.: cultural.

CAPRIFOLIACEAE

Lonicera japonica Thunb.; cultural, game opening.
Sambucus canadensis L.; cultural, roadside.

CARYOPHYLLACEAE

Arenaria serpyllifolia L.; cultural, railroad bed.
Cerastium nutans Raf.; cultural, roadside.
Cerastium viscosum L.; cultural, roadside.
Cerastium vulgatum L.; cultural, railroad bed.

Dianthus armeria L.; cultural, trail.
Silene stellata (L.) Ait.; cultural, trail.
Stellaria media (L.) Cyrillo; cultural, roadside.

CELASTRACEAE

Euonymus atropurpureus Jacq.; cultural, roadside.

CHENOPODIACEAE

Chenopodium missouriense Aellen; cultural, railroad bed.

CISTACEAE

Lechea tenuifolia Michx.; sandstone glade.

COMMELINACEAE

Commelina communis L.; cultural, game opening.
Tradescantia ohiensis Raf.; cultural, railroad bed.
Tradescantia subaspera Ker; mesic forest.

COMPOSITAE

Achillea millefolium L.; cultural, roadside.
Ambrosia artemisiifolia L.; cultural, roadside.
Ambrosia bidentata Michx.; cultural, roadside.
Ambrosia trifida L.; cultural, roadside.
Antennaria plantaginifolia (L.) Richards; upland forest.
Aster anomalus Engelm.; sandstone glade.
Aster cordifolius L.; sandstone glade.
Aster lateriflorus (L.) Britt.; upland forest.
Aster ontarionis Wieg.; cultural, trail.
Aster patens Ait.; upland forest.
Aster pilosus Willd.; cultural, game opening.
Aster sagittifolius Wedem. ex Willd.; upland forest.
Aster simplex Willd.; cultural, roadside ditch.
Aster turbinellus Lindl.; sandstone glade.
Bidens aristosa L.; cultural, game opening.
Bidens comosa (Gray) Wieg.; cultural, roadside ditch.
Boltonia asteroides (L.) L'Her.; cultural, game opening.
Cacalia atriplicifolia L.; mesic forest.
Cirsium discolor (Muhl.) Spreng.; cultural, game opening.
Eclipta alba (L.) Hassk.; cultural, roadside ditch.
Elephantopus carolinianus Willd.; mesic forest.
Erigeron annuus (L.) Pers.; floodplain forest.
Erigeron canadensis L.; cultural, roadside.
Erigeron philadelphicus L.; cultural, railroad bed.
Erigeron strigosus Muhl.; mesic forest.
Eupatorium coelestinum L.; cultural, game opening.
Eupatorium fistulosum Barratt; cultural, game opening.
Eupatorium perfoliatum L.; cultural, roadside ditch.
Eupatorium purpureum L.; mesic forest.
Eupatorium rugosum Houtt.; mesic forest.
Eupatorium serotinum Michx.; mesic forest.
Helenium flexuosum Raf.; cultural, railroad bed.
Helianthus annuus L.; cultural, railroad bed.
Helianthus decapetalus L.; upland forest.
Helianthus divaricatus L.; upland forest.
Helianthus hirsutus Raf.; upland forest.
Helianthus microcephalus Torr. & Gray; mesic forest.
Helianthus petiolaris Nutt.; cultural, game opening.
Helianthus strumosus L.; cultural, trail.
Helianthus tuberosus L. var. subcanescens Gray; mesic forest.
Heliopsis helianthoides (L.) Sweet; mesic forest.
Hieracium gronovii L.; upland forest.
Krigia biflora (Walt.) Blake.; sandstone glade.
Krigia dandelion (L.) Nutt.; upland forest.

Krigia oppositifolia Raf.; upland forest.
Lactuca canadensis L.; cultural, railroad bed.
Lactuca floridana (L.) Gaertn.; cultural, roadside.
*Lactuca hirsuta Muhl.; cultural, railroad bed.
Lactuca serriola L.; cultural, roadside.
Matricaria matricarioides (Less.) Porter; cultural, roadside.
Rudbeckia hirta L.; cultural, roadside.
Senecio aureus L.; aultural, roadside ditch.
Senecio glabellus Poir.; floodplain forest.
Silphium perfoliatum L.; cultural, game opening.
Solidago caesia L.; mesic forest.
Solidago canadensis L.; cultural, game opening.
Solidago juncea Ait.; sandstone glade.
Solidago nemoralis Ait.; upland forest.
Solidago patula Muhl.; cultural, roadside ditch.
Solidago rugosa Mill.; cultural, roadside ditch.
Solidago speciosa Nutt.; upland forest.
Solidago ulmifolia Muhl.; mesic forest.
Taraxacum officinale Weber.; cultural, roadside.
Tragopogon dubius Scop.; cultural, railroad bed.
Verbesina alternifolia (L.) Britt.; occasional, roadside.
Verbesina helianthoides Michx.; upland forest.
Veronia gigantea (Walt.) Trel.; cultural, game opening.
Veronia missurica Raf.; cultural, game opening; common.

CONVOLVULACEAE

Calystegia sepium (L.) R. Br. var. americana (Sims.) Mohlenbr.; cultural, railroad bed.
Convolvulus arvensis L.; cultural, railroad bed.
Cuscuta campestris Yuncker.; cultural, trail.
Cuscuta gronovii Willd.; cultural, railroad bed.
Ipomoea hederacea (L.) Jacq.; cultural, railroad bed.
Ipomoea pandurata (L.) G. F. W. May.; cultural, railroad bed.

CORNACEAE

Cornus florida L.; mesic forest.

CRUCIFERAE

Arabidopsis thaliana (L.) Heynh.; cultural, game opening.
Arabis laevigata (Muhl.) Poir.; mesic forest.
Barbarea vulgaris R. Br. var. arcuata (Opiz) Fries; cultural, railroad bed.
Capsella bursa-pastoris (L.) Medic.; cultural, roadside.
Cardamine bulbosa (Schreb.) BSP.; mesic forest.
Cardamine hirsuta L.; mesic forest.
Cardamine pensylvanica Muhl.; mesic forest.
Draba brachycarpa Nutt.; cultural, old field.
Dentaria laciniata Muhl.; mesic forest.
Lepidium campestre (L.) R. Br.; cultural, railroad bed.
Lepidium virginicum L.; cultural, railroad bed.
Thlaspi arvense L.; cultural, railroad bed.

CUCURBITACEAE

Melothria pendula L.; cultural, railroad bed.

CUPRESSACEAE

Juniperus virginiana L.; sandstone glade.

CYPERACEAE

Carex abdita Bickn., upland forest.
Carex annectens Bickn.; floodplain forest.
Carex artitecta Mackenz.; upland forest.
Carex blanda Dewey; mesic forest.
Carex caroliniana Schwein.; mesic forest.
Carex cephalophora Muhl.; upland forest.
Carex crinita Lam.; pond.

Carex crus-corvi Shuttlew.; floodplain forest.
Carex digitalis Willd.; upland forest.
Carex flaccosperma Dewey; mesic forest.
Carex frankii Kunth.; mesic forest.
Carex glaucodea Tuckerm.; mesic forest.
Carex grayii Carey; floodplain forest.
Carex hirsutella Mackenz.; upland forest.
Carex jamesii Schwein.; mesic forest.
Carex leavenworthii Dewey; mesic forest.
Carex lupuliformis Sartwell; shrub swamp.
Carex lupulina Muhl.; shrub swamp.
Carex muhlenbergii Schkuhr; upland forest.
Carex muhlenbergii Schk. var. enervis Boott; upland forest.
Carex normalis Mackenz.; mesic forest.
Carex projecta Mackenz.; cultural, trail.
Carex retroflexa Muhl.; upland forest.
Carex rosea Schkuhr; mesic forest.
Carex scoparia Schkuhr; shrub swamp.
Carex shortiana Dewey; cultural, trail.
Carex squarrosa L.; cultural, trail.
CArex stipata Muhl.; mesic forest.
Carex torta Boott; mesic forest.
Carex tribuloides Wahlenb.; cultural, game opening.
Carex umbellata Schkuhr; sandstone glade.
Carex vulpinoidea Michx.; cultural, trail.
Cyperus esculentus L.; cultural, roadside.
Cyperus esculentus L. var. leptostachyus Boeckl.; cultural, roadside ditch.
Cyperus ovularis (Michx.) Torr.; cultural, game opening.
Cyperus strigosus L.; cultural, trail.
Eleocharis obtusa (Willd.) Schult.; cultural, game opening.
Scirpus atrovirens Willd.; cultural, roadside ditch.

DIOSCOREACEAE

Dioscorea quaternata (Walt.) J. F. Gmel.; mesic forest.
Dioscorea villosa L.; mesic forest.

EBENACEAE

Diospyros virginiana L.; cultural, game opening.

ELAEAGNACEAE

Elaeagnus angustifolia L.; cultural, game opening.

ERICACEAE

Vaccinium arboreum Marsh.; sandstone glade.

EUPHORBIACEAE

Acalypha gracilens Gray; upland forest.
Acalypha rhomboidea Raf.; cultural, roadside.
Acalypha virginica L.; cultural, game opening.
Chamaesyce maculata (L.) Small; cultural, railroad bed.
Chamaesyce supina (Raf.) Moldenke; cultural, railroad bed.
Croton monanthogynus Michx.; sandstone glade.
Crotonopsis elliptica Willd.; sandstone glade.
Euphorbia corollata L.; upland forest.
Poinsettia dentata (Michx.) Kl. & Garcke; cultural, railroad bed.

EQUISETACEAE

Equisetum arvense L.; floodplain forest.

FAGACEAE

Fagus grandifolia Ehrh.; mesic forest.
Quercus alba L.; mesic forest.
Quercus coccinea Muenchh.; sandstone glade.
Quercus imbricaria Michx.; sandstone glade.
Quercus marilandica Muenchh.; sandstone glade.
Quercus michauxii Nutt.; mesic forest.

Quercus muhlenbergii Engelm.; mesic forest.
Quercus palustris Muenchh.; mesic forest.
Quercus rubra L.; mesic forest; common.
Quercus stellata Wangh.; upland forest.
Quercus velutina Lam.; upland forest.

GENTIANACEAE

Obolaria virginica L.; mesic forest.
Swertia caroliniensis (Walt.) Kuntze; mesic forest.

GERANIACEAE

Geranium carolinianum L.; cultural, railroad bed.
Geranium maculatum L.; mesic forest.

HAMAMELIDACEAE

Liquidambar styraciflua L.; floodplain forest.

HYDROPHYLLACEAE

Hydrophyllum appendiculatum Michx.; mesic forest.
Hydrophyllum canadense L.; mesic forest; common
Hydrophyllum virginianum L.; mesic forest.

HYPERICACEAE

Ascyrum hypericoides L. var. multicaule (Michx.) Fern.; sandstone glade.
Hypericum drummondii (Grev. & Hook.) Torr. & Gray; upland forest.
Hypericum gentianoides (L.) BSP.; sandstone glade.
Hypericum punctatum Lam.; cultural, roadside.

IRIDACEAE

Belamcanda chinensis (L.) DC.; mesic forest.
Iris pseudacorus L.; cultural, game opening.
Iris shrevei Small; cultural, railroad bed.
Sisyrinchium angustifolium Mill.; cultural, roadside.

JUGLANDACEAE

Carya glabra (Mill.) Sweet; upland forest.
Carya laciniosa (Michx.) Loud.; mesic forest.
Carya ovalis (Wang.) Sarg.; upland forest.
Carya ovata (Mill.) K. Koch; mesic forest.
Carya tomentosa (Poir.) Nutt.; upland forest.
Junglans cinerea L.; floodplain forest.

JUNCACEAE

Juncus dudleyi Wieg.; cultural, roadside.
Juncus effusus L. var. solutus Fern. & Wieg.; shrub swamp.
Juncus interior Wieg.; cultural, roadside.
Juncus marginatus Rostk.; cultural, game opening.
Juncus secundus Beauv.; sandstone glade.
Juncus tenuis Willd.; cultural, trail.
Juncus torreyi Coville; cultural, game opening.
Luzula multiflora (Retz.) Lejeune; upland forest.

LABIATAE

Agastache nepetoides (L.) Ktze.; mesic forest.
Blephilia ciliata (L.) Benth.; cultural, railroad bed.
Blephelia hirsuta (Pursh) Benth.; shrub swamp.
Collinsonia verna Nutt.; mesic forest.
Cunila origanoides (L.) Britt.; upland forest.
Glechoma hederacea L. var. micrantha Moricand; floodplain forest.
Lamium purpurem L.; cultural, roadside.
Lycopus americanus Muhl.; cultural, game opening.
Lycopus rubellus Moench.; floodplain forest.
Monarda bradburiana Beck; cultural, roadside.

Monarda fistulosa L.; cultural, game opening.
Perilla frutescens L.; cultural, trail.
Prunella vulgaris L. var. lanceolata (Bart.) Fern.; cultural, game opening.
Pycnanthemum incanum (L.) Michx.; cultural, game opening.
Pycnanthemum tenuifolium Schrad.; mesic forest.
Scutellaria incana Biehler; cultural, game opening.
Scutellaria lateriflora L.; shrub swamp.
Scutellaria ovata Hill var. versicolor (Nutt.) Fern.; mesic forest.
Scutellaria parvula Michx. var. leonardii (Epling) Fern.; upland forest.
Stachys palustris L. var. phaneropoda Weath.; cultural, roadside.
Stachys tenuifolia Willd.; cultural, trail.
Stachys tenuifolia Willd. var. hispida (Pursh) Fern.; floodplain forest.
Synandra hispidula (Michx.) Baill.; mesic forest.
Teucrium canadense L. var. virginicum (L.) Eat.; cultural, railroad bed.

LAURACEAE

Lindera benzoin (L.) Blume; floodplain forest.
Sassafras albidum (Nutt.) Nees; cultural, roadside.

LEGUMINOSAE

Amphicarpa bracteata (L.) Fern.; cultural, pine plantation.
Amphicarpa bracteata (L.) Fern. var. comosa (L.) Fern.; cultural, railroad bed.
Apios americana Medic.; cultural, railroad bed.
Cassia fasciculata Michx.; cultural, railroad bed.
Cassia nictitans L.; cultural, railroad bed.
Cercis canadensis L.; mesic forest.
Clitoria mariana L.; cultural, game opening.
Desmanthus illinoensis (Michx.) MacM.; cultural, railroad bed.
Desmodium canescens (L.) DC.; cultural, railroad bed.
Desmodium dillenii Darl.; upland forest.
Desmodium glutinosum (Muhl.) Wood; upland forest.
Desmodium nudiflorum (L.) DC.; mesic forest.
Desmodium paniculatum (L.) DC.; cultural, game opening.
Desmodium pauciflorum (Nutt.) DC.; mesic forest.
Gleditsia triacanthos L.; floodplain forest.
*Lathyrus hirsutus L.; cultural, railroad bed.
Lespedeza cuneata (Dum-Cours.) G. Don; cultural, railroad bed.
Lespedeza hirta (L.) Hornem.; upland forest.
Lespedeza striata (Thunb.) Hook. & Arn.; cultural, game opening.
Medicago lupulina L.; cultural, railroad bed.
Melilotus alba Desr.; cultural, roadside.
Melilotus officinalis (L.) Lam.; cultural, railroad bed.
Psoralea psoralioides (Nutt.) var. eglandulosa (Ell.) Freeman; upland forest.
Robinia pseudoacacia L.; cultural, roadside.
Strophostyles helvola (L.) Ell.; cultural, railroad bed.
Strophostyles umbellata (Muhl.) Britt.; upland forest.
Stylosanthes biflora (L.) BSP.; upland forest.
Trifolium campestre Schreb.; cultural, game opening.
Trifolium dubium Sibth.; cultural, game opening.
Trifolium hybridum L.; cultural, trail.
Trifolium pratense L.; cultural, roadside.
Trifolium repens L.; cultural, roadside.
*Trifolium resupinatum L.; cultural, trail.
Vicia dasycarpa Ten.; cultural, railroad bed.

LEMNACEAE

Lemna obscura (Austin) Daub.; pond.
Spirodela polyrhiza (L.) Schleiden; pond.

LENTIBULARIACEAE

Utricularia vulgaris L.; pond.

LILIACEAE

Allium canadense L.; cultural, railroad bed.
Asparagus officinalis L.; cultural, roadside.
Erythronium americanum Ker; mesic forest.
Hemerocallis fulva L.; cultural, game opening.
Lilium michiganense Farw.; mesic forest.
Narcissus poeticus L.; cultural, game opening.
Narcissus pseudo-narcissus L.; cultural, game opening.
Nothoscordum bivalve (L.) Britt.; sandstone glade.
Ornithogalum umbellatum L.; cultural, game opening.
Polianthes virginica (L.) Shinners; sandstone glade.
Polygonatum commutatum (Schult.) A. Dietr.; mesic forest.
Smilacina racemosa (L.) Desf.; mesic forest.
Trillium recurvatum Beck; mesic forest.
Yucca filamentosa L. var. smalliana (Fern.) Ahles; cultural, game opening.

LINACEAE

Linum medium (Planch.) Britt. var. texanum (Planch.) Fern.; sandstone glade.

LYTHRACEAE

Ammannia coccinea Rottb.; cultural, railroad bed.
Cuphea petiolata (L.) Koehne; cultural, railroad bed.

MAGNOLIACEAE

Liriodendron tulipifera L.; mesic forest.

MALVACEAE

Abutilon theophrastii Medic.; cultural, railroad bed.

MENISPERMACEAE

Menispermum canadense L.; cultural, railroad bed.

MORACEAE

Morus rubra L.; mesic forest.

NYCTAGINACEAE

Mirabilis nyctaginea (Michx.) MacM.; cultural, railroad bed.

NYMPHAEACEAE

Nuphar luteum L. ssp. variegatum (Engelm.) Beal; pond.

OLEACEAE

Fraxinus americana L.; upland forest.
Fraxinus pensylvanica Marsh.; mesic forest.
Fraxinus pensylvanica Marsh. var. subintegerrima (Vahl) Fern.; floodplain forest.

ONAGRACEAE

Circaea quadrisulcata (Maxim.) Franch. & Sav. var. canadensis (L.) Hara; floodplain forest.
Epilobium coloratum Muhl.; pond.
Jussiaea repens L. var. glabrescens Ktze.; pond.
Ludwigia alternifolia L.; mesic forest.
Oenothera biennis, L. var. canescens Torr. & Gray; cultural, game opening.

OPHIOGLOSSACEAE

Botrychium biternatum (Sav.) Underw.; upland forest.
Botrychium virginianum (L.) Sw.; mesic forest.

ORCHIDACEAE

Aplectrum hyemale (Muhl.) Torr.; mesic forest.

OROBANCHACEAE

Epifagus virginiana (L.) Bart.; mesic forest.

OXALIDACEAE

Oxalis dillenii Jacq.; cultural, roadside.
Oxalis stricta L.; cultural, old field.
Oxalis violacea L.; sandstone glade.

PAPAVERACEAE

Corydalis flavula (Raf.) DC.; floodplain forest.
Dicentra cucullaria (L.) Bernh.; mesic forest.
Sanquinaria canadensis L.; mesic forest.

PASSIFLORACEAE

Passiflora lutea L. var. glabriflora Fern.; cultural, roadside.

PHRYMACEAE

Phryma leptostachya L.; mesic forest.

PHYTOLACCACEAE

Phytolacca americana L.; cultural, roadside.

PINACEAE

Pinus echinata Mill.; cultural, pine plantation.

PLANTAGINACEAE

Plantago aristata Michx.; cultural, roadside.
Plantago lanceolata L.; cultural, roadside.
Plantago rugelii Dcne.; cultural, roadside.
Plantago virginica L.; cultural, game opening.

PLATANACEAE

Platanus occidentalis L.; floodplain forest.

POACEAE

Agropyron smithii Rydb.; cultural, railroad bed.
Agrostis alba L.; cultural, roadside.
Agrostis hyemalis (Walt.) BSP.; mesic forest.
Alopecurus carolinianus Walt.; cultural, game opening.
Andropogon virginicus L.; cultural, railroad bed.
Aristida purpurascens Poir.; sandstone glade.
Arundinaria gigantea (Walt.) Chapm.; floodplain forest.
Brachelytrum erectum (Schreb.) Beauv.; mesic forest.
Bromus commutatus Schrad.; cultural, railroad bed.
Bromus pubescens Muhl.; mesic forest.
Bromus racemosus L.; cultural, roadside.
Bromus secalinus L.; cultural, railroad bed.
Bromus tectorum L.; cultural, roadside.
Chasmanthium latifolium (Michx.) Yates; mesic forest.
Cinna arundinacea L.; mesic forest.
Dactylis glomerata L.; cultural, game opening.
Danthonia spicata (L.) Beauv.; sandstone glade.
Diarrhena americana Beauv. var. obovata Gleason; floodplain forest.
Digitaria sanguinalis (L.) Scop.; cultural, roadside.
Echinochloa pungens (Poir.) Rydb.; cultural, old field.
Echinochloa pungens (Poir.) Rydb. var. wiegandii Fassett; cultural, roadside.
Eleusine indica (L.) Gaertn.; cultural, railroad bed.
Elymus canadensis L.; upland forest.
Elymus hystrix L.; cultural, roadside.
Elymus virginicus L.; cultural, game opening.
Elymus virginicus L. var. glabriflorus (Vasey) Bush; floodplain forest.
Elymus villosus Muhl.; mesic forest.
Eragrostis cilianensis (All.) Mosher; cultural, railraod bed.
Eragrostis pectinacea (Michx.) Nees; cultural, railroad bed.
Eragrostis poaeoides Beauv.; cultural, roadside.

Festuca arundinacea Schreb.; mesic forest.
Festuca obtusa Bieler; mesic forest.
Festuca pratensis Huds.; cultural, old field.
*Glyceria arkansana Fern.; floodplain forest.
Glyceria striata (Lam.) Hitchcock; floodplain forest.
Holcus lanatus L.; cultural, game opening.
Hordeum pusillum Nutt.; cultural, roadside.
Leersia oryzoides (L.) Swartz; pond.
Leersia virginica Willd.; pond.
Lolium multiflorum Lam.; cultural, game opening.
Lolium perenne L.; cultural, game opening.
Muhlenbergia frondosa (Poir.) Fern.; mesic forest.
Muhlenbergia sobolifera (Muhl.) Trin.; upland forest.
Panicum anceps Michx.; cultural, roadside.
Panicum boscii Poir.; upland forest.
Panicum clandestinum L.; mesic forest.
Panicum commutatum Schult.; upland forest.
Panicum dichotomum L.; upland forest.
Panicum lanuginosum Ell. var. fasciculatum (Torr.) Fern.; cultural, roadside.
Panicum lanuginosum Ell. var. implicatum (Scribn.) Fern.; mesic forest.
Panicum lanuginosum Ell. var. lindheimeri (Nash) Fern.; upland forest.
Panicum laxiflorum Lam.; mesic forest.
Panicum microcarpon Muhl.; mesic forest.
Panicum oligosanthes Schult. var. scribnerianum (Nash) Fern.; sandstone glade.
Panicum polyanthes Schult.; floodplain forest.
Panicum rigidulum Bosc; pond.
Paspalum ciliatifolium Michx.; cultural, roadside.
Paspalum laeve Michx.; pond.
Paspalum pubiflorum Rupr. var. glabrum (Vasey) Vasey; cultural, roadside.
Poa annua L.; cultural, roadside ditch.
Poa compressa L.; cultural, roadside.
Poa pratensis L.; cultural, roadside.
Poa sylvestris Gray; mesic forest.
Phleum pratense L.; cultural, roadside.
Schizachyrium scoparium (Michx.) Nash; sandstone glade.
Setaria faberi Herrm.; cultural, railroad bed.
Setaria lutescens (Weigel) Hubb.; cultural, railroad bed.
Setaria viridis (L.) Beauv.; cultural, railroad bed.
Sorghum halepense (L.) Pers.; cultural, roadside.
Sphenopholis obtusata (Michx.) Scribn.; mesic forest.
Sphenopholis obtusata (Michx.) Scribn. var. major (Torr.) Erdman; cultural, roadside.
Spenopholis nitida (Biehler) Scribn.; upland forest.
Tridens flavus (L.) Hitchcock; cultural, old field.
Vulpia octoflora (Walt.) Rydb. var. glauca (Nutt.) Fern.; cultural, trail.

POLEMONIACEAE

Phlox divaricata L.: mesic forest.
Phlox paniculata L.; mesic forest.
Phlox pilosa L.; upland forest.
Polemonium reptans L.; mesic forest.

POLYGALACEAE

Polygala sanquinea L.; cultural, game opening.

POLYGONACEAE

Polygonum aviculare L.; cultural, railroad bed.
Polygonum cespitosum Blume var. longisetum (DeBruyn) Steward; cultural, trail.
Polygonum convolvulus L.; cultural, railroad bed.
Polygonum cristatum Engelm. & Gray; mesic forest.
Polygonum hydropiperoides Michx.; shrub swamp.
Polygonum pensylvanicum L.; cultural, old field.

Polygonum pensylvanicum L. var durum Stanford; cultural, old field.
Polygonum pensylvanicum L. var. laevigatum Fern.; cultural, roadside ditch.
Polygonum persicaria L.; cultural, game opening.
Polygonum punctatum Ell.; shrub swamp.
Polygonum sagittatum L.; floodplain forest.
Polygonum tenue Michx.; sandstone glade.
Polygonum virginianum L.; mesic forest.
Rumex acetosella L.; cultural, game opening.
Rumex crispus L.; cultural, game opening.
Rumex verticillatus L.; cultural, roadside ditch.

POLYPODIACEAE

Adiantum pedatum (Tourn.) L.; mesic forest.
Asplenium pinnatifidum Nutt.; mesic forest.
Asplenium platyneuron (L.) Oakes; mesic forest.
Asplenium rhizophyllum L.; mesic forest.
Asplenium trichomanes L.; mesic forest.
Athyrium pycnocarpon (Spreng.) Tidestrom; mesic forest.
Athyrium thelypterioides (Michx.) Desv.; mesic forest.
Cheilanthes feei Moore; sandstone glade.
Cheilanthes lanosa (Michx.) D. C. Eaton; sandstone glade.
Cystopteris fragilis (L.) Bernh.; mesic forest.
Cystopteris fragilis (L.) Bernh. var. protrusa Weatherby; mesic forest.
Dryopteris marginalis (1.) Gray; mesic forest.
Onoclea sensibilis L.; shrub swamp.
Polypodium polypodioides (L.) Walt var. michauxianum Weatherby; upland forest.
Polypodium vulgare L. var. virginianum (L.) Eaton; upland forest.
Polystichum acrostichoides (Michx.) Schott; mesic forest.
Thelypteris hexagonoptera (Michx.) Weatherby; mesic forest.
Woodsia obtusa (Spreng.) Torr.; upland forest.

PORTULACACEAE

Claytonia virginica L.; mesic forest.

PRIMULACEAE

Dodecatheon meadia L.; upland forest.
Hottonia inflata Ell.; pond.
Lysimachia ciliata L.; floodplain forest.
Lysimachia nummularia L.; pond.

RANUNCULACEAE

Actaea pachypoda Ell.; mesic forest.
Anemone virginiana L.; upland forest.
Anemonella thalictroides (L.) Spach; mesic forest.
Clematis virginiana L.; cultural, railroad bed.
Delphinium tricorne Michx.; mesic forest.
Hydrastis canadensis L.; mesic forest.
Myosurus minimus L.; cultural, old field.
Ranunculus abortivus L.; cultural, roadside.
Ranunculus abortivus L. var acrolasius Fern.; mesic forest.
Ranunculus hispidus Michx.; mesic forest.
Ranunculus micranthus Nutt.; mesic forest.
Ranunculus pusillus Poir.; shrub swamp.
Ranunculus recurvatus Poir.; mesic forest.
Ranunculus septentrionalis Poir.; floodplain forest.
Ranunculus sceleratus L.; pond.
Thalictrum dioicum L.; mesic forest.

RHAMNACEAE

Ceanothus americanus L.; mesic forest.

ROSACEAE

Agrimonia parviflora Ait.; mesic forest.
Agrimonia pubescens Wallr.; cultural, roadside.
Agrimonia rostellata Wallr.; mesic forest.
Aruncus dioicus (Walt.) Fern.; mesic forest.
Fragaria virginiana Duchesne; cultural, trail.
Geum canadense Jacq.; cultural, railroad bed.
Geum vernum (Raf.) Torr. & Gray; mesic forest.
Gillenia stipulata (Muhl.) Baill.; mesic forest.
Potentilla norvegica L.; cultural, game opening.
Potentilla recta L.; cultural, roadside.
Potentilla simplex Michx.; cultural, trail.
Prunus serotina Ehrh.; mesic forest.
*Pyrus pyrifolia (Burmf.) Nakai.; cultural, game opening.
Rosa carolina L.; upland forest.
Rosa multiflora Thunb.; cultural, roadside.
Rosa palustris Marsh.; shrub swamp.
Rosa setigera Michx.; cultural, old field.
Rubus flagellaris Willd.; cultural, railroad bed.
Rubus occidentalis L.; cultural, roadside.
Rubus pensylvanicus Poir.; cultural, roadside.

RUBIACEAE

Cephalanthus occidentalis L.; shrub swamp.
Galium aparine L.; mesic forest.
Galium circaezans Michx.; upland forest.
Galium obtusum Bigel.; mesic forest.
Galium pilosum Ait.; upland forest.
Galium tinctorium L.; floodplain forest.
Galium triflorum Michx.; mesic forest.
Houstonia longifolia Gaertn.; upland forest.
Houstonia longifolia Gaertn. var. tenuifolia (Nutt.) Wood; upland forest.

SALICACEAE

Populus deltoides Marsh.; shrub swamp.
Salix amygdaloides Anderss.; cultural, game opening.
Salix fragilis L.; shrub swamp.
Salix nigra Marsh.; floodplain forest.

SAURURACEAE

Saururus cernuus L.; shrub swamp.

SAXIFRAGACEAE

Heuchera hirsuticaulis (Wheelock) Rydb.; cultural, railroad bed.
Heuchera parviflora Bartl. var. rugelii (Shuttlw.) Rosend.; mesic forest.
Hydrangea arborescens L.; cultural, roadside.
Penthorum sedoides L.; cultural, roadside ditch.

SCROPHULARIACEAE

Chelone obliqua L. var. speciosa Pennell & Wherry; floodplain forest.
Collinsia verna Nutt.; floodplain forest.
Gerardia tenuifolia Vahl var. macrophylla Benth.; mesic forest.
Gerardia skinneriana Wood; sandstone glade.
Lindernia anagallidea (Michx.) Pennell; cultural, roadside.
Mimulus alatus Ait; cultural, roadside ditch.
Penstemon calycosus Small; mesic forest.
Penstemon digitalis Nutt.; cultural, railroad bed.
Penstemon pallidus Small; cultural, railroad bed.
Scrophularia marilandica L.; mesic forest.
Verbascum thapsus L.; cultural, game opening.
Veronica arvensis L.; cultural, roadside.
Veronica peregrina L.; cultural, roadside ditch.
Veronicastrum virginicum (L.) Farw.; mesic forest.

SMILACACEAE

Smilax glauca Walt.; mesic forest.
Smilax hispida Muhl.; floodplain forest.
Smilax rotundifolia L.; upland forest.

SOLANACEAE

Datura stramonium L.; cultural, railroad bed.
Physalis angulata L.; cultural, railroad bed.
Solanum americanum Mill.; cultural, railroad bed.
Solanum carolinense L.; cultural, railroad bed.

STAPHYLEACEAE

Staphylea trifolia L.; mesic forest.

TYPHACEAE

Typha angustifolia L.; pond.
Typha latifolia L.; pond.

ULMACEAE

Celtis occidentalis L.; floodplain forest.
Ulmus alata Michx.; sandstone glade.
Ulmus americana L.; cultural, railroad bed.
Ulmus rubra Muhl.; mesic forest.

UMBELLIFERAE

Chaerophyllum procumbens (L.) Crantz; floodplain forest.
Cicuta maculata L.; mesic forest.
Cryptotaenia canadensis (L.) DC.; cultural, roadside.
Daucus carota L.; cultural, roadside.
Erigenia bulbosa (Michx.) Nutt.; mesic forest.
Osmorhiza longistylis (Torr.) DC. var. villicaulis Fern.; mesic forest.
Sanicula canadensis L.; upland forest.
Sanicula gregaria Bickn.; floodplain forest.
Thaspium trifoliatum (L.) Gray var. flavum Blake; cultural, roadside.
Torilis japonica (Houtt.) DC.; cultural, roadside.

URTICACEAE

Boehmeria cylindrica (L.) Sw.; floodplain forest.
Laportea canadensis (L.) Wedd.; floodplain forest.
Parietaria pensylvanica Muhl.; upland forest.
Pilea pumila (P.) Gray; mesic forest.

VALERIANACEAE

Valeriana pauciflora Michx.; mesic forest.
Valerianella radiata (L.) Dufr.; cultural, old field.

VERBENACEAE

Lippia lanceolata Michx.; cultural, roadside ditch.
Verbena hastata L.; cultural, roalroad bed.
Verbena urticifolia L.; cultural, roadside.

VIOLACEAE

Hybanthus concolor (T. F. Forst.) Spreng.; mesic forest.
Viola pratincola Greene; mesic forest.
Viola pubescens Ait. var. eriocarpa (Schwein.) Russell; mesic forst.
Viola rafinesquii Greene; cultural, roadside.
Viola sororia Willd.; mesic forest.
Viola striata Ait.; floodplain forest.

VITACEAE

Parthenocissus quinquefolia (L.) Planch.; mesic forest.
Vitis aestivalis Michx.; upland forest.
Vitis cinerea Engelm.; floodplain forest.
Vitis vulpina L.; cultural, roadside ditch.

Six natural communities were found in the Cave Valley/Pomona Natural Bridge study area. A description of each natural community with emphasis on the corresponding flora follows.

Sandstone Glade

A glade is an opening in the forest, usually caused by bedrock at the surface. Soil accumulation is slight as a result of intense wind and water erosion. Soil moisture is low and plants occurring in this natural community are drought tolerant. *Quercus marilandica*, *Q. stellata*, and *Q. coccinea*, which dominate the woody layer, are scrubby in form. *Vaccinium arboreum* and *Rhus aromatica* are often of greater stature than these diminutive oaks. *Juniperus virginiana* is also well adapted to this harsh environment.

Drought resistant herbs grow in depressions where soil material accumulates. *Oxalis violacea*, *Linum medium*, *Opuntia compressa*, and *Nothoscordum bivalve* add color to the otherwise drab background. *Cheilanthes lanosa*, *C. feei*, *Lechea tenuifolia*, and *Aristida purpurascens* also occur on these ledges.

Soil accumulation is greater further from the bluff's edge, and less drought tolerant plants set root. These areas are characterized by *Gerardia skinneriana*, *Polianthes virginica*, *Hypericum gentianoides*, *Carex umbellata*, and *Danthonia spicata*.

The color pagentry of spring returns in autumn. *Aster tubinellus*, *A. cordifolius*, *Solidago juncea*, and *S. speciosa* grow well where soil accumulation occurs. *Schizachyrium scoparium* lends contrast to this scene.

Upland Forest

Forests are communities that are dominated by trees, with an average canopy cover of at least 80% (White and Madany, 1978). High topographic position and steepness in slope result in soils that are poorly developed and excessively drained. These forests are found intergrading with glades on bedrock escarpments or on the steep slopes of the minor stream valleys.

The thin layer of soil supports a drought tolerant flora. An oak-hickory forest dominated by *Q. velutina*, *Q. stellata*, and *Carya tomentosa* is found in the uplands. *Quercus marilandica*,

Q. glabra, and Fraxinus americana are inter-mixed among the dominants. Growth is slow, but the woody layer isn't stunted. A shrub layer was usually absent. The occurrence of Rosa carolina, Toxicodendron radicans, and Vitis aestivalis, however, was indicative of disturbance.

The vernal aspect of the herbaceous layer was represented by Antennaria plantaginifolia, Krigia dandelion, K. oppositifolia, and Dodecatheon media, Panicum boscii, P. lanuginosum, Carex artitecta, C. retroflexa, and Lazula multiflora are indicative of graminoids found as part of the vernal aspect of this habitat.

The change of season brought a different semblance to the upland forest. Stylosanthes biflora, Hypericum drummondii, Desmodium glutinosum, Asclepias quadrifolia, and A. variegata replaced the vernal aspect. In autumn, composites such as Aster patens, A. sagittifolius, Solidago nemoralis, and S. speciosa were the most abundant herbs.

The dry habitat wasn't conducive to the establishment of the more mesic pteridophytes. Woodsia obtusa, Polypodium polypodioides, and Polypodium vulgare var. virginianum, however, grew on the exposed bedrock.

Mesic Forest

These forests occur in areas that are of lesser slopes than areas supporting upland forest or on level soil. As a result, run off is moderate and the soil profile is wet for a significant period of time (White and Madany, 1978).

Mesic upland forests were found on the lesser slopes of the minor creek valleys. A particularly rich mesic woods is found on a terrace in the Cave Creek floodplain. In both cases, run off is slow, resulting in a wet soil profile, and a significant amount of soil accumulates. A diverse flora was found within these areas of high moisture conditions and stable habitat. A dense canopy of Acer saccharum, Fagus grandifolia, and Carya ovata is found in the ravines. The woody dominants of the terrace are Quercus alba, Q. rubra, and Carya ovata. Liriodendron tulipifera is found inter-mixed within both these mesic woods. Woody shade-tolerants, such as Morus rubra, Ostrya virginiana, Carpinus caroliniana, Cercis canadensis, Staphylea

trifolia, Asimina triloba, and Cornus florida form an understory beneath a dense canopy.

The ephemeral flora of this habitat is well know. Erigenia bulbosa was the first plant to emerge in the spring. Afterwards, the blossoms of Claytonia virginica, Sanquinaria canadensis, Erythronium americanum, Dicentra cucullaria, Dentaria laciniata, Trillium recurvatum, and Viola spp. become manifest.

This moist habitat was ideal for pteridophytes. Asplenium pinnatifidum, A. rhizophyllum, and A. trichomanes, were conspicuous on the rock outcrops frequently found in the mesic woods. Additionally, Thelypteris hexagonoptera, Athyrium pycnocarpon, A. thelypterioides, Adiantum pedatum, and Botrychium virginianum were found.

Carex rosea, C. blanda, C. torta, Brachyelytrum erectum, Sphenopholis obtusata and Cinna arundinacea represented the monocotyledonous plants. Other characteristic plants adding to the great diversity were Solidago caesia, Mertensia virginica, Podophyllum peltatum, Hydrophyllum appendiculatum, Phlox paniculata, Veronicastrum virginicum, and Geranium maculatum.

Floodplain Forest

These forests are found along the major creek valley floors. They are subjected to runoff from the uplands. The impermeable soils and lack of slope result in the pooling of the run off. The resulting inundated soils support a woody canopy dominated by Acer saccharinum, A. negundo, Liquidambar styraciflua, and Fraxinus pennsylvanica var. subintegerrima. An understory is nearly absent except in the disturbed areas, where Arundinaria gigantea and Lindera benzoin were found. Laportea canadensis is vividly remembered as occurring in the disturbed floodplains.

Two herbaceous monotypic colonies of Corydalis flavula and Viola striata accounted for the spring flora of this habitat. As the season progressed, Impatiens pallida, I. biflora, Polygonum sagittatum, and Lysimachia ciliata were found. Graminoids were represented by Diarrhena americana, Carex grayii, and C. crus-corvi.

Ponds

Ponds as distinguished from lakes are generally calm, shallow waters lacking a wave swept shore (White and Madany, 1978). This community occurs in the valley floor of Cave Creek. The water is typically still and shallow enough to permit the colonization of Nuphar luteum over most of its surface. In shallower water, the rooted aquatic Jussiaea repens var. glabrescens was found. Lemna obscura and Spirodela polyrhiza were found floating among these rooted aquatics.

In still shallower water, Typha latifolia, T. angustifolia, Ranunculus sceleratus, and Hottonia inflata emerged from the organic soil. On the banks, Lysimachia nummularia, Epilobium coloratum, Panicum rigidulum, Leersia oryzoides, and Paspalum laeve were encountered.

Shrub Swamp

A swamp is a wetland dominated by woody plants. A true swamp is forested, while the woody vegetation of this community is shrubby (White and Madany, 1978). The shrub swamp occurring in the Cave Creek floodplain was subjected to flooding throughout the entire growing season. Only in late fall did the water recede.

These hydric soils supported the shrubby Cephalanthus occidentalis, Rosa palustris, and Salix fragilis. Populus deltoides was conspicuous at the swamp margins. Sedges and rushes were represented by Carex crinita, C. lupulina, C. lupuliformis, C. scoparia, and Juncus effusus var. solutus. The absence of an overstory and the hydric condition facilitated the dominance of these graminoids, along with Saururus cernuus.

Asclepias incarnata, Blephilia hirsuta, Scutellaria lateriflora, and Onoclea sensibilis were found among the dominants.

Cultural Communities

Old fields, roadsides, railroad tracks, game openings, and tree plantations are all included under this heading. The unifying factor is human disturbance. With the exception of tree plantations, great species diversity is found in these habitats.

Woody plants such as Diospyros virginiana, Rhus copallina, R. glabra, Juniperus virginiana, Sassafras albidum, Sambucus canadensis and Elaeagnus angustifolia were found. Ascelepias syriaca, Achillea millefolium, Ambrosia trifida, A. artemesiifolia, and Daucus carota were characteristic. Rudbeckia hirta, Solidago spp., Taraxacum officinale, and Tragopogon dubius were representative of the composites. Iris shrevii and Narcissus pseudo-narcissus brought welcome color to the game openings. Leguminous plants such as Trifolium spp., Melilotus alba, Lespedeza cuneata, and Cassia fasciculata were common. Festuca pratensis, Dactylis glomerata, Andropogon virginicus, Hordeum pusillum, Elymus hystrix, Sorghum halepense, and Tridens flavus represented the grasses. Additionally, eleven members of the Polygonaceae and an equal number of taxa from the Rosaceae added to the great diversity of the artificial habitat.

A total of 552 vascular plants belonging to 100 families have been collected and identified from the Cave Valley/Pomona Natural Bridge area. Five of these species, notably, Lactuca hirsuta, Melothria pendula, Synandra hispidula, Botrychium biternatum, and Glyceria arkansana are endangered in Illinois (Sheviak, 1981). Vinca major, Lactuca hirsuta, Lathyrus hirsutus, Trifolium resupinatum, Pyrus pyrifolia, and Glyceria arkansana have been collected from the study area but are previously unreported from Jackson County, Illinois (Mohlenbrock and Ladd, 1978).

The most floristically diverse natural community of the study area is the mesic forest. A total of 125 taxa were collected from this community. Sixteen taxa were collected from the pond making this the least diverse natural community.

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The Use and Folklore of Common Prairie Plants

Russell R. Kirt

INTRODUCTION

The purpose of this presentation is to acquaint people with the use of prairie plants primarily from the open mesic prairie. Most of the information regards primitive man as his culture was intricately tied with plants and the environment. A glossary of medicinal terms is provided at the end of this text. Nomenclature is from Plants of the Chicago Region by Swink and Wilhelm, 1979. Hopefully this review of humanistic uses of prairie plants will help people remember them and assist in prairie preservation and restoration activities.

These plants are all rare when compared to their abundance in pre-settlement times, therefore I urge you not to remove any for experimentation. My knowledge comes from books only as I have not experimented with any plant materials except for Pycnanthemum virginianum (L.) Durand & Jackson, COMMON MOUNTAIN-MINT. Also, since there is a poisonous nature to parts of many plants, it is unwise for the amateur to experiment. An instance has been related about aged man, a member of the Mide, who came to a lodge one winter night tired and cold. He said, "Never mind, I have some medicine which will soon warm me." He then took a packet from the skull of his Mide bag, put a little of the contents in water and drank it. A few minutes later he said, "I have taken the wrong medicine; I shall die." And in a few hours he was dead (Densmore, 1928).

Allium spp., WILD ONIONS, Liliaceae (Lily)

Most Allium spp. are known to be edible and were used for food by Indian tribes (Kirk, 1975). In addition to seasoning, they are/were eaten fresh as a relish, cooked as a flavor for meat and soup, fried, steamed, and creamed. Wild onions were collected and stored for winter use. The Indians undoubtedly caused some local extinction of wild onions due to their extensive use. Ingestion of large amounts of onions, including cultivated ones, may cause poisoning due to their alkaloids. However, it is safe to eat normal amounts of wild onions in the same manner as cultivated onions.

In addition to the above, A. cernuum Roth, NODDING WILD ONION has been used as a stimulant in increasing perspiration and urine flow. It has also been used as a cough remedy and to cure intestinal worms. The whole plant was used as an insect repellent when rubbed on the body (Kavasch, 1977). Historians believe that "Chicago" comes from the Algonquian word meaning "wild onion".

Amorpha canescens Pursh, LEAD PLANT, Fabaceae (Legume)

Other common names for Amorpha canescens include: "buffalo bellow plant" as its time of blooming is synchronous with the rutting season of the buffalo (Gilmore, 1977) and "prairie shoestring" because when the virgin prairie was plowed, the breaking of the roots sounded like snapping shoestring. Another reason for the plant being called "prairie shoestring" is because of its deep roots which often penetrate to depths of fifteen feet or more (Voigt and Mohlenbrock, 1978).

Omaha Indians broke the stems of lead plant into small pieces, moistened, and attached them to the skin. After attachment, the stem was lit on fire and burned down to the skin. This was believed to ward off neuralgia and rheumatism (Gilmore, 1977). Dr. Paul Sorenson of Northern Illinois University (DeKalb, Illinois) has experimented with extracts of lead plant as a potential cure for some cancers (per. com.).

American Indians used the dried leaves for tea and pipe smoking, sometimes mixed with a little buffalo fat (Gilmore, 1977). Local superstitions have held that the lead plant was an indicator of lead ore (this is true around Galena, Illinois), but the common name refers to the lead-color of the leaves in dense lead plant colonies (Johnson and Nichols, 1970).

Andropogon gerardii Vitman, BIG BLUE STEM, Poaceae (Grass)

This plant was used to cure indigestion and fever. Big blue stem is among the best and most palatable of the prairie grasses for ungulates both in quality (over 6% protein) and quantity.

Antennaria spp., PUSSYTOES, Asteraceae (Composite)

The gum of pussytoe stalks can be chewed to make a pleasing gum claimed to be somewhat nourishing. The flowers are an attractive addition in dried arrangements. This small plant was enjoyed as a fine smoking plant and became known as Ladies' Tobacco by many northeastern tribes (Kavasch, 1977). The entire plant was made into a tea which was given to mothers after childbirth to purge the afterbirth and aid internal healing. Pussytoes was also useful as a douche for vaginitis (Moore, 1979).

Asclepias tuberosa L., BUTTERFLY MILKWEED, PLEURISY ROOT, Asclepiadaceae (Milkweed)

Common names for this plant come from its ability to attract butterfies and other insects and its medicinal uses for diseases of the respiratory system. Asclepias tuberosa is most unusual in two respects: it has no milky sap and usually has bright orange flowers but flower color can vary from yellow-orange.

In some parts of eastern New Mexico, this plant is called "Immortal". It is a stimulant to the vagus nerve, producing perspiration and brochial dilation. As its name implies, it is useful for pleurisy and mild pulmonary edema. However if more than a scant teaspoon of chopped root, boiled in water, is taken in dosages of more than one or two cups a day, nausea and vomiting will occur (Moore, 1982). This plant has also been used as an expectorant and emetic. Pleurisy root was also pulverized after drying and blown into wounds or was chewed into a paste which was placed on wounds. Ceremonials connected with the digging, preparation, consecration, and distribution of this plant by the Shell Society of the Omaha Indians occupied four days (Gilmore, 1977).

Asclepias spp., MILKWEEDS, Asclepiadaceae (Milkweed)

The flowers may be eaten raw or boiled; the buds, young shoots and young leaves are good as greens or boiled in soup with meat. The seeds and the inner wall of the pod may be eaten raw or cooked. The latex, even though it contains a bitter alkaloid, of some milkweed species was chewed by Plains Indians. If consumed by insect larva alkaloid residues are still present in

the adults and are distasteful to some predators. All of the milkweeds of this genus contain asclepain, a good meat tenderizer (Kirk, 1975). Dr. Paul Sorenson of Northern Illinois University (DeKalb, Illinois) has experimented with _A. sullivantii_ as a potential cure for some cancers (per. com.).

The United States Department of Agriculture once considered the possibility of using the seed hairs of certain milkweed species in place of kapok in filling life rafts (Kirk, 1975). A "silky type" rope can be made from the hairs. The latex of many milkweed species may offer possibilities in rubber production (Voigt and Mohlenbrock, 1978).

Aster laevis L., SMOOTH BLUE ASTER, Asteraceae (Composite)

The smoke from the burning of this plant has been used to treat fainting and comas (Owensby, 1980).

Baptisia spp., WILD INDIGOS, Fabaceae (Legume)

The young growth of all species of wild indigo resemble asparagus but must not be eaten because during its first stages of development, the plant is poisonous (Owensby, 1980). Indian children used the mature inflorescence of seed pods as rattles.

Early settlers, and perhaps also the Indians, collected seeds in the fall from _Baptisia leucantha_ T. & G., WILD INDIGO, and made soup which supposedly tasted like lentil soup (per. com., Deborah Drazdik). Dr. C. Wayne Ogzewalla of the University of Cincinnati is currently doing research with this plant species (per com.).

The roots of _Baptisia leucophaea_ Nutt., CREAM WILD INDIGO, have been used as a laxative, astringent, and antiseptic, in addition to being useful to induce vomiting. When boiled, its roots can be used as an internal remedy for fever, sore throat, typhus, and scarlet fever. A poultice made from the roots of _B. leucophaea_ also serves as a treatment for ulcers. The Indians made a decoction of the leaves of this plant and applied it to cuts and wounds, and also used this decoction as a stimulant (Owensby, 1980). A dark blue dye material has been extracted from the leaves and fruits but it is inferior to the real indigo dye (Voigt and Mohlenbrock, 1978).

Castilleja coccinea (L.) Spreng., INDIAN PAINT BRUSH, Scrophulariaceae (Figwort)

The Indians used this plant to help cure rheumatism, paralysis, colds, and disease of women (Densmore, 1928). The common name is appropriate as these plants appear as though they have been dipped in a bucket of paint.

Ceanothus americanus L., NEW JERSEY TEA, Rhamanaceae (Buckthorn)

During the American Revolution, the leaves of this plant were used as a substitute for tea. The fresh flowers make an excellent lather when crushed and rubbed in water, and are said to leave the skin soft and faintly fragrant. As an added note, the tea made by this plant was initially used as a hair tonic (Kirk, 1975). On the buffalo hunt, when timber was scarce, the great gnarled woody roots were used as fuel (Gilmore, 1977).

The Indians used a decoction of New Jersey Tea roots to treat cancer, syphilis, gonorrhea, and dysentery. The plant has also been used to treat eye disease in small children. New Jersey Tea was an excellent home remedy for menstrual hemorrhage, nosebleeds, ulcerated sore throats, bleeding piles, hemorrhoids, external skin disorders, and old ulcers, as well as a treatment for capillary ruptures from vomiting or coughing. It also aids in the shrinking of nonfibrous cysts, stimulation of lymph glands and inter-tissue fluid for circulation, and in the reduction of enlarged spleens (Moore, 1982).

Cirsium spp., THISTLES, Asteraceae (Composite)

Roots of Cirsium spp. have been eaten raw, boiled and roasted. They are nutritious though flat in taste. The peeled stems may be cooked or eaten raw (Kirk, 1975). Thistles were also used to cure diseases of women (Densmore, 1928). Cirsium discolor, C. hillii, and C. pitcheri are native to Illinois prairies.

Echinacea pallida Nutt., PURPLE CONEFLOWER, Asteraceae (Composite). Figure 1.

This plant was universally used as an antidote for snake bites, stings, burns, wounds, and other venomous/poisonous conditions. It was employed as a smoke treatment to relieve headaches.

Figure 1. Photo of Echinacea pallida, PURPLE CONEFLOWER. This plant is still sought after by "root-diggers". Photo by Russell R. Kirt.

Figure 2. Photo of Veronicastrum virginicum, CULVER'S ROOT. Named after Dr. Culver, the root of this plant has many medicinal uses. Photo by Russell R. Kirt.

Indians chewed pieces of purple coneflower rootstalk as a remedy for toothaches and relief of mumps. They used the root extract as a remedy for blood poisoning and cancer (Owensby, 1980). Juices from the plant were also used to treat horse distemper (Johnson and Nichols, 1970). A Winnebago said he had often used the plant to make his mouth insensitive to heat, so that for show he could take a live coal into his mouth (Gilmore, 1977).

Today, the purple coneflower (or black sampson) is still used as medicine for healing wounds, curing sore throats, and reducing pain. Pharmaceutical companies purchase quantities of the root for medicines. This plant has been extirpated from many prairies in Missouri and Kansas by commercial collectors (Clubine, 1982).

Eryngium yuccifolium Michx., RATTLESNAKE MASTER, Apiaceae (Parsnip)

The common name originates from its use to treat rattlesnake bites. The roots of this plant have been used medicinally for liver ailments, to increase urine flow, to induce vomiting, and as an emetic, expectorant, and a diaphoretic (Owensby, 1980). A liquid made from roots smashed in cold water was drunk to relieve muscular pains and rheumatism. Inhalation of smoke from the plant was also used to cure headaches, nosebleeds, and tonsil inflammation. A decoction from the root of rattlesnake master has been found useful in dropsy; chronic laryngitis and bronchitis; irritation of the urethra, vaginal, uterine, and cystic mucous membranes; gonorrhea; and exhaustion from sexual depletion with loss of erectile power, seminal emissions, and orchitis (Millspaugh, 1974).

Fragaria virginiana Duchesne, WILD STRAWBERRY, Rosaceae (Rose)

The berries, though small, are sweet and delicious. Many people prefer them to domestic varieties of cultivated strawberries. Indians prepared tea from the green leaves. A gourmet commercial tea from wild strawberry is available. This slightly tart tea has a mild astringent effect which can be used for pregnancy, convalescence, and chronic stomach sensitivity. It has a mild but noticeable diuretic effect. If drunk frequently, it will help hematuria and diarrhea. If the rootstalks are included in the tea, it can be used as a douche for vaginitis and as an enema for diarrhea (Moore, 1982).

Figure 3. Photo of Lithospermum canescens, PRAIRIE PUCCOON. An excellent ornamental plant in addition to providing dyes. Photo by Russell R. Kirt.

The fruit is purported to tighten loose teeth, clean teeth, clear blurred vision, and remedy gout (Owensby, 1980). Other medicinal values of wild strawberry include its use as an astringent, diuretic, laxative and a tonic. Folklore remedies include use for bladder or kidney ailments, bowel troubles, dysentery, intestinal weakness, night sweats and as a stomach cleanser. It has also been used as a gargle for sore throats.

Gentiana andrewsii Griseb., BOTTLE GENTIAN, Gentianaceae (Gentian). Figure 4.

A decoction made from the roots of this plant was used as a tonic. The plant served as a treatment for bites and stings. Sometimes a piece of the rhizome was worn or carried in the belief that it will increase one's physical powers. Native Americans once made compresses from the roots and applied them to aching backs (Smith and Smith, 1980). Gentiopicrin (for malaria) and gentisic acid (for rheumatic inflammations) are still used in pharmacy. The rhizome has also been used to treat fever, gout, joint inflammation, and as an aid for nervous distress (Moore, 1982).

Geum triflorum Pursh, PRAIRIE SMOKE, Rosaceae (Rose)

The roots may be boiled to produce a beverage resembling weak sassafras tea (Johnson and Nichols, 1970). It undoubtedly had many medicinal uses. Because of its plumose fruits, it is also called "old man's whiskers" (Voight and Mohlenbrock, 1977).

Helianthus spp., SUNFLOWERS, Asteraceae (Composite)

Sunflower plants provide dark gray seeds that are excellent when eaten raw or roasted. Various Indian tribes parched the seeds, ground them into meal and made nutritious bread and cakes. Many Indian tribes cultivated sunflowers and extracted oil from their seeds. Purple and black dyes were made from the seeds, and a yellow dye was boiled from the ray flowers. The seeds can be used for human, poultry, and pet food. Oil used for cooking, margarine, and paints may be extracted by boiling the crushed seeds and then skimming the oil from the surface of the water. The roasted shells were once used as a coffee substitute. The leaves were dried and used as a tobacco substitute in cigars and pipes (Kavasch, 1977).

Figure 4. Photo of Gentiana andrewsii, BOTTLE GENTIAN. Gentiana spp. provides perhaps the best stomach tonics from the plant kingdom. Their extracts are still used in pharmacy. Photo by Russell R. Kirt.

Sunflower seeds were sacred food to the Plains Indians of the prairie regions of North America. They placed bowls of sunflower seeds on the graves of their dead. This was food to sustain them on their long and dangerous journey to their Happy Hunting Ground.

Heuchera richardsonii R. Br., PRAIRIE ALUM-ROOT, Saxifragaceae (Saxifrage)

The roots of Heuchera spp. are an effective cure when eaten raw for diarrhea (Kirk, 1975). In addition to healing sore mouths (Densmore, 1928), the geranium-like leaves were used to close wounds.

Liatris spp., BLAZING STARS, Asteraceae (Composite)

The Indians used the corm-like root of blazing stars both fresh and for stored food. They supposedly tasted like carrots. When the plant is dried just prior to the opening of the flowers, it makes an attractive addition to dried arrangements. The Indians boiled the leaves and corm together to produce a decoction which was given to children for diarrhea. In addition the corms, after being chewed, were blown into the nostrils of horses to enable them to run well without getting out of breath. It was also supposed to strenghen and help them stay in good condition (Gilmore, 1977).

Blazing stars were used as a diuretic, e.g., to increase the volume of water in the urine for mild bladder and urethra infections. One problem with using this plant as a diuretic is that it decreases the amount of phosphates in urine when used over an extended period of time (Moore, 1982).

Lilium spp., LILIES, Lilicaeae (Lily)

A tincture of Lilium spp. has been used to relieve mental exhaustion, headaches, dullness of the eye, bitter tastes in the mouth, constipation, extremity weaknesses, and restlessness (Millspaugh, 1974). All of the true lilies have edible bulbs, but because of their relative rarity and beauty they should not be harvested except in great emergency. The bulbs may be eaten raw or cooked, and have an excellent flavor.

Lithospermum canescens (Michx.) Lehm., PRAIRIE PUCCOON, Boraginaceae (Borage). Figure 3.

Children used the roots of this plant to chew with their gum. The flowers were likewise used to color the gum yellow. A purple dye can be extracted from the root.

Monarda fistulosa L., WILD BERGAMONT, BEEBALM, Lamiaceae (Mint)

Bergamont oil (which contains thymol) extracted from the dried, boiled leaves, was used by numerous tribes to treat cold symptoms and bronchitis. This volatile oil served as a stimulant to relieve stomach gases (Kavasch, 1977). It was used to suppress menstruation. Also, an antiseptic and anesthetic gargle for sore throats was made from it. Indians used wild bergamont to treat intestinal ailments and dermal eruptions on the face. Modern medicine uses an antiseptic drug derived from this genus (Johnson and Nichols, 1970).

Wild bergamont makes an excellent flavoring when cooked with other food, and a good tea may be steeped from the leaves. Flowers and herbage have been used to scent clothes closets, bureau drawers, and pillows.

Panicum virgatum L., SWITCH GRASS, Poaceae (Grass)

The seeds are edible raw or ground, and may be used in mush or cakes (Kirk, 1975).

Petalostemum spp., PRAIRIE CLOVERS, Fabaceae (Legume)

The Pawnee Indians used Petalostemum candidum (Willd.) Michx., WHITE PRAIRIE CLOVER and P. purpureum (Vent.) Rydb., PURPLE PRAIRIE CLOVER as prophylactics (Gilmore, 1977). When the roots were pulverized and boiled the decoction was drunk in order to keep venereal disease away. Commanche Indians chewed the roots for their pleasant taste and made tea from its leaves. Other American Indians used bruised leaves of these plants steeped in water and applied it to fresh wounds (Owensby, 1980). Petalostemum spp. are considered one of the most important groups of legumes in native grasslands since they fix nitrogen, making it available for associated grasses (Johnson and

Nichols, 1970). Thus, prairie clovers are valuable additions to prairie hay. In addition, the Pawnees used the tough, elastic stems of prairie clovers to make brooms for sweeping their lodges (Gilmore, 1977).

Pycnanthemum virginianum (L.) Durand & Jackson, COMMON MOUNTAIN-MINT, Lamiaceae (Mint)

The leaves of the plant make an excellent tea when the flowers are in bloom (per. exp.). Also, the leaves can be used as seasoning in cooking (Voight and Mohlenbrock, 1977).

Ratibida pinnata (Vent.) Barnh., YELLOW CONEFLOWER, Asteraceae (Composite)

The leaves and flowers may be brewed into a pleasant tea.

Salix humilis Marsh, PRAIRIE WILLOW, Saliceae (Willow)

The bitter inner bark of many willows may be eaten raw as an emergency food. It is more palatable when dried and ground into flour. The Indians undoubtedly had many uses for the stems, such as basketry. The inner bark was used in Indian steam baths to relieve rheumatic discomforts. Also, the inner bark contains the glucoside salicin, a primitive form of aspirin (Kavasch, 1977). Thus, willow root and bark trees were brewed and drunk to relieve pain and reduce fevers.

Silphium laciniatum L., COMPASS PLANT, Asteraceae (Composite)

Indians made tea from the leaves of this plant and used it to hasten the milk flow of new mothers. The whole plant has been used to increase urine flow and to soothe sore and chapped skin. Early settlers used the juice from the plant as a sedative and nerve tonic. At one time, the milky sap was thought to be useful as a substitute for opium (another common name is WILD OPIUM), but this idea never gained ground.

Indian children gathered chewing gum from the upper parts of the stem, where the gum exudes and forms large lumps. Omahas say that wherever this plant is found lightning is prevalent and they would not set up camp in such places. However, they

burned the dried roots during electrical storms so that its smoke might act as a charm to avert lightning strike (Gilmore, 1977). Compass plant stems, by themselves or with a mixture of buffalo chips, were used as fuel for fires.

Livestock seek it out and hence it is not found where they have a chance to graze (Owensby, 1980). The leaves of this plant commonly align themselves in a north-south direction - thus its common name.

Silphium spp., Asteraceae (Composite)

The following information primarily refers to Silphium integrifolium Michx., ROSIN WEED, and S. perfoliation L., CUP PLANT. A decoction of both the flower and the leaves was used to treat lung diseases, pneumonia, small pox, and gonorrhea. A tea made from the flowers and leaves was administered to relieve stomach pains, treat urinary ailments, and cure skin rashes caused by toxic plants such as poison ivy. Rosin weed was also used as a mild sedative and cardiac relaxant, although not always reliable.

The root stocks of these plants were used in smoke treatment for head colds, neuralgia, and rheumatism. A Winnebago medicine-man said a decoction made from the root stock was used as an emetic in preparatory cleansing and lustration before going on a buffalo hunt. It was also used for cleansing ceremonial defilement incidents due to accidental proximity to a woman during her menstrual period (Gilmore, 1977).

Sorghastrum nutans (L.) Nash, INDIAN GRASS, Poaceae (Grass)

The seeds may be used whole or ground into flour.

Spartina pectinata Link, PRAIRIE CORD GRASS, Poaceae (Grass)

The seeds may be used whole or ground into flour. This plant was used as thatching to support the earth covering of the lodges and for mats (Gilmore, 1977). Indians may have made arrows from the stems.

Sporobolus heterolepis Gray, PRAIRIE DROPSEED, Poaceae (Grass)

The tiny seeds are fairly easy to harvest as they are relatively free of their husk. They may be eaten raw, but are best when parched and ground into flour (Kirk, 1975). The maturing seeds have a noticeable buttered popcorn smell.

Stipa spartea Trin., PORCUPINE GRASS, NEEDLE GRASS, Poaceae (Grass)

The Indians used the stiff awns of this plant as a brush for dressing the hair. This brush was used as part of the Indian ceremonies (Gilmore, 1977). Porcupine grass is very nutritious and relished by all livestock, but should not be grazed during June and July when the seeds are present as the awns can cause mechanical injury to an animal by sticking in its mouth (Johnson and Nichols, 1970).

Tradescantia ohiensis Raf., SPIDERWORT, Commelinaceae (Spiderwort)

Tradescantia ohiensis is being used as a biological indicator to check radiation emitted from nuclear power plants in the U.S., Japan, and Europe. Radiation turns the blue cells of the stamen hairs to pink. The increase in pink cells is proportional to the dose of radiation received, even if the doses are extremely low. A color change can be observed in the stamen hairs most efficiently 12 to 13 days after exposure to radiation. The plant may also be eaten as vegetable greens. Another colorful common name, "cow-sobbers," has been given this plant because of the strings of mucilaginous sap (Owensby, 1980).

Veronicastrum virginicum (L.) Farw., CULVER'S ROOT, Scrophulariaceae (Figwort). Figure 2.

The dried tubers of this plant were used as a mild laxative. Many native peoples used the fresh root for its cathartic qualities, to reduce fever, and as a stomach tonic and laxative (Kavasch, 1977). The common name of the plant is named after Dr. Culver, a physician who recorded uses of the plant.

CONCLUSION

This partial survey of the botanical lore for primitive man is meant to be an introduction to the many uses and popular knowledge of some of our indigenous prairie plants. WILD QUININE, Parthenium integrifolium L. and many other plants that suggest a use have not been discussed in this manuscript leaving this information for others to search out. This review of ethnic botany suggests that this system of science never came to maturity in the grassland areas of the United States as it was cut off in its infancy by a more advanced stage of culture. Many ethnobotany studies are now occuring in South America countries, however, one does not have to leave our grasslands to learn and be involved in the exciting science of "ethnobotany".

ACKNOWLEDGEMENTS

I wish to thank Eric Ulaszek for his encouragement to me to write this manuscript in addition to critically reviewing it. Also, I thank Susan J. Donnelly of College of DuPage Staff Services for her patience in the typing of this manuscript.

GLOSSARY

ASTRINGENT: A substance that causes tissues to shrink, and is used to stop bleeding, secretions, and the like.

DECOCTION: A preparation made by boiling the hard materials, such as the roots, bark, or large seeds of herbs.

DIURETIC: An herb or medicine that causes an increase of urine flow.

EMETIC: A substance that promotes vomiting.

ENEMA: A liquid injected into the rectum as a medicine or purge.

EXPECTORANT: A substance that stimulates the outflow of mucus from the lungs and bronchials.

HEMATURIA: The presence of blood in the urine.

NEURALGIA: An acute pain manifested along the length of a nerve, often having no detectable effects other than the pain.

POULTICE: A preparation of fresh leaves that are crushed and steeped in boiling water for a short time. It is then applied to the skin, usually between two pieces of muslin, to remedy skin disorders such as pain, inflammation, and tissue damage.

PROPHYLACTIC: Anything that prevents disease.

PURGE: Something that will evacuate the intestine.

STIMULANT: An agent, such as beverage, that produces a temporary increase in vital activity.

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ERIGENIA 8

JANUARY 1987

THE LOWER CACHE RIVER BASIN OF SOUTHERN ILLINOIS

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Cover Photo: View of original Cache channel looking east from the Karnak Belknap road; this road crosses on fill placed in the channel to divert the lower Cache water flowing east past the Main Brothers sawmill at Karn

NUMBER 8 JANUARY 1987

THE LOWER CACHE RIVER BASIN OF SOUTHERN ILLINOIS

by Max D. Hutchison[1]

[1] Mr. Hutchison is Field Representative for the Natural Land Institute. This special issue is excerpted from "Lower Cache River Plan", prepared for and funded by The Nature Conservancy through the Natural Land Institute. It is used by permission of The Nature Conservancy.

EDITORIAL

At long last Erigenia 8 has rolled off the presses, and I trust that after reading this issue you will agree that it has been worth the wait. In the pages that follow, we have devoted an entire issue to the unique and fragile Lower Cache River Basin in Southern Illinois. The text of this issue first appeared in a technical report prepared by the Natural Land Institute for the Illinois Nature Conservancy by Max Hutchison, Field Representative for the Natural Land Institute. It is reprinted here in a slightly shortened form. Continued destruction of this habitat would indeed be very unfortunate. After reading this account or after having visited this habitat, one can understand the importance of the preservation of the Lower Cache River Basin for our children and their children yet to come.

I would like to remind our readers of the need for manuscripts to be published in this journal. Erigenia 7 was a milestone issue, in that it was the first issue in which every article printed was unsolicited by the editor. If you have an idea for an article, please feel free to call me at my office: (602) 820-0800.

"Desk Top Publishing" is soon to come to Erigenia. The eminent arrival of a Macintosh Plus computer with a laser printer will enable us to abandon the archaic cutting and pasting method of assemblage of this journal for a more efficient and professional looking journal. Watch for these improvements in Erigenia 9 or 10.

- Mark W. Mohlenbrock

Preface

I have known the Cache River for more than 40 years. As a boy four years of age, I caught my first fish in Dutchman Creek, the stream behind the house where we lived in the early 1940's. When I was five, I sat on a pile of boxes with my sister, high on the dresser in our living room, and watched the flood waters of that same stream rush in the windows and doors of our home. I still remember how my sister's doll swirled around and around as it floated out the front door.

Later, while growing up, we lived several other places in southern Illinois, but we were never very far from the Cache River, or "creek" as we called it. I spent what seemed like endless days in the swamps following my dad as we picked up hickory nuts, slipped on squirrels, trapped for mink, treed "coons", set out bank poles, and swam in the Cache. I can also remember what seemed like endless summer nights, slapping at mosquitoes and trying to sleep in houses without screens.

When I was 12 years old, I thought there was no end to the bottomland forests around Belknap. But, as I wandered a little farther each year, it came to me that the woods and swamps didn't just go on and on. There was a field on the other side of Heron Pond, and somebody did live beyond the "Section 5" woods. This bothered me a little, but still, there seemed to be a lot of "wild" country left.

Then, in the 1950's and 1960's, I watched the bulldozers move in and begin clearing bottomland on a grand scale. It took a while for me to comprehend what was happening. Entire sections of timberland were cleared in a single summer. It was with sadness that I watched cypress swamps like Turkey Pond, where I killed my first fox squirrel, disappear. It was also quite a shock to see how small it looked as a soybean field.

Now, when I try to describe the places I used to roam and play, where I swung on grapevines, caught crawdads, built rafts, stepped on snakes, and "hogged" fish, I realize that most of them are gone. My children don't have the woods to grow up in that I did, and I can't help but wonder what it will be like when they are my age.

It appears that most area residents assume that the changes are inevitable, a necessary part of progress. I don't agree. I believe that we will all be a little poorer when there's little left to see along the Cache but buildings, roads, and cropland. We need to save some of the last remnants of the original wilderness, the forests and swamps that were so much a part of our history, for future generations to learn to know and appreciate.

My objective in preparing this report is to support the current efforts to preserve one of the largest and most significant natural areas in the state, the Lower Cache River Swamps. This wetland is over 3,000 acres and includes a 10-mile segment of the lower Cache River. For many years it has been a noted natural area in southern Illinois, and in several other parts of the state as well, because of its popularity as a place to hunt ducks and catch fish. But, it was not until the 1970's that Illinois scientists really became aware of the area's unique natural features and ecological significance. As continued drainage efforts and land clearing activities threatened to destroy this area, as they had so much of the original swampland in the Cache Valley, concerned individuals began to organize and encourage the acquisition of key parcels of the property by conservation agencies. Many of the private landowners along this part of the Cache have actively supported public acquisition for the purpose of preserving it. A few farmers and local landowners have opposed the preservation efforts because they fear that keeping water in the swamps will hinder farmland drainage.

Some excellent newspaper and magazine articles have been written and several scientific reports have been published that contain good descriptions of the area's character. Among the agencies and institutions sponsoring recent studies that discuss various aspects of the Cache River watershed problems are the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the National Park Service, the Soil Conservation Service, The Nature Conservancy, the Illinois Nature Preserves Commission, the Natural Land Institute, the Illinois Department of Conservation, the Illinois Natural History Survey, the Illinois State Geological Survey, the University of Illinois, and the Citizen's Committee To Save The Cache. With the involvement of so many, it soon became evident that a coordinated plan to guide acquisition and determine long-term management for the preservation of natural areas was needed.

Following discussions among members and staff personnel of The Nature Conservancy, the Illinois Department of Conservation, and

the Natural Land Institute, the Natural Land Institute agreed to prepare a preservation plan for the Lower Cache River Swamps Natural Area. The Nature Conservancy provided funding in the form of a grant to the Natural Land Institute.

This plan is not a "technical report" in the sense that it objectively describes the methodology and results of a detailed scientific study. Most of the general descriptive information is already published and fairly well documented. Its purpose is to provide a better understanding of what is happening in the watershed and what must be done to preserve the natural area as well as to protect all of the natural resources within the watershed. Problems are discussed, needs are identified, and management activities are recommended. A significant product of the effort is the compilation of references and location of data sources.

Many individuals helped me with this report and provided facts, insight, and advice. Ralph Burnett of The Nature Conservancy, Bill Donels of the Illinois Department of Conservation, and Neal Needham of The Citizens Committee To Save The Cache provided extra amounts of help and information. Dr. Scott Yaich of the Cooperative Wildlife Research Unit at Southern Illinois University volunteered time and helped me find much of the background material listed in the reference section. Allen Main of Karnak, Illinois told me a lot about the history of the area. Anice Corzine and his wife Janice of the Citizens Committee To Save The Cache had a vital part in providing data, background information, photographs, and editing. Some personal opinions are included, and some biases are probably obvious, but I have made an honest effort to support my recommendations with documentation to the extent such was practical within the time and cost limitations of the study.

Introduction

There is an unusual valley that crosses the southern tip of Illinois, extending from the Ohio River on the east, to the Mississippi River on the west. It is unique in that it represents the geographical point on the continent where the last invasion of the sea into the Midwest reached its northernmost limit. It is also within a few miles of the southernmost extent of the continental glaciers.

This valley, with its wide flat bottomland, is as large as the valleys of the Ohio and Mississippi nearby, yet it contains no great river. The relatively small Cache River is its major stream, and the valley is commonly known as the Cache River Basin.

This Basin is from one to two miles wide with flat terraces and bottomlands extending as finger-like projections into the bordering hilly areas along tributary streams. Prior to settlement, much of it was swampland, and most of the remaining forest tracts and many cleared farm fields are still annually flooded and poorly drained.

Primarily because of its geographical location and complex geologic history, the Cache River watershed is biologically diverse with a large number of species. It is of special interest to natural area preservationists as it has nearly 60 identified natural areas recognized as being of at least state-wide significance. Three of the largest natural areas are designated as National Natural Landmarks.

The Cache area is primarily rural, and most of the land that is not forested is used for agriculture. It has severe soil erosion and drainage problems that concern farmers, hunters and fishermen, land speculators, and conservation agencies. There has been little coordinated land use planning in the past.

The area of primary concern is the Lower Cache River Swamps Natural Area. It is a contiguous corridor of forested swamps bordering the lower Cache River, nine and one-quarter miles long and averaging about one-half mile in width. It is within the two counties of Johnson and Pulaski, in sections 7, 8, 9, 10, 11, 14, 15, 16, 17, and 18, Township 14 South, Range 2 East, and sections 12, 13, 14, 15, 16, 21, and 22, Township 14 South, Range 1 East of the 3rd Principal Meridan.

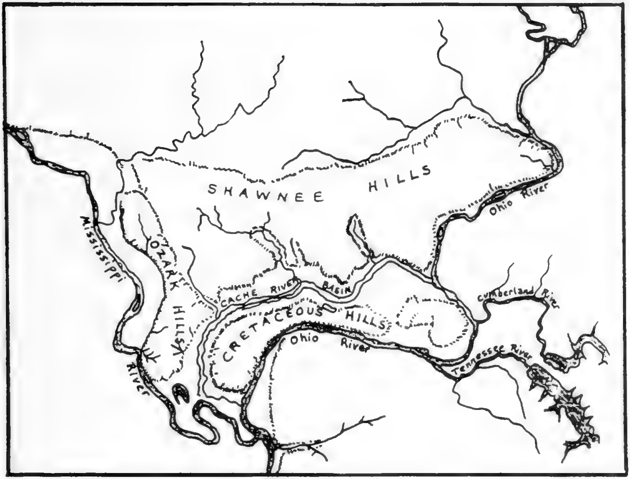

Figure 1. Map of southern Illinois showing major physiographic regions

As this is a natural area of national significance, it is of high priority for preservation. Being a wetland, its character is threatened by both direct and indirect disturbances occuring throughout the entire watershed. Natural versus unnatural changes are often difficult to distinguish, and the basic causes of idsturbing processes are not easy to identify. A special emphasis of this study was to determine what the area was originally like, how the natural processes of the watershed worked prior to 1800, and to document the impact of disturbances since settlement.

During 1984, the Cache River watershed area was observed during different seasons and under varying weather conditions. Long-time residents of the area were interviewed, old maps, photographs, and historical documents were located, and professional individuals who have studied various aspects of the area were consulted. Over 200 written documents were reviewed and referenced. This report is a compilation of facts and interpretations contributed by many individuals, and only a small fraction of the background information gathered is presented.

The initial objective was to find simple practical effective solutions to the problems threatening the quality and very survival of the natural area. This objective was not achieved, and the problems were found to be so complex and long-term, it was difficult during the course of the study to keep from becoming pessimistic about the future of the area. A lot of alternatives were studied and considered. The final conclusion of this report is that the Lower Cache River Natural Area can be saved and managed in a manner that will preserve its significant features, but there will be a cost. As it will be of benefit to the public for generations to come, it is a noble and worthwhile effort worth the cost. The efforts will take time and must have the cooperation of federal, state, and local agencies. To actually be accomplished, the endeavor will also need the support of the public and all of us that are involved. One important fact is evident, time is critical. As each year passes, the problems become more difficult and costly to solve.

Presettlement Character

Geologic History *

Although the Cache River as we know it did not exist until near the end of the Great Ice Age, the general pattern of drainage across the midwestern states was set millions of years ago when the region became lowland between the Appalachian and Rocky Mountains. For eons, rivers from the north, east, and west have met in the Illinois region to flow southward to the sea.

The bedrock formations exposed in the upper part of the Cache River watershed were deposited 500 million to 300 million years ago during Devonian, Mississippian, and Pennsylvanian times. These are sedimentary layers that originated mainly in the marine seas that intermittently invaded the continent.

The Devonian deposits are the oldest, and this part of the Paleozoic Era is referred to as the Age of Fishes. They were originally soluble limestones that have been partly dissolved and replaced by silica, forming thick beds of white chert. This chert was later altered along fractured zones to a powdery substance referred to as tripoli. Toward the end of the Devonian time, there was a great influx of mud, and much shale was formed. The rugged hills along the Mississippi River north of the present site of Olive Branch have narrow ridges and deep ravines and are a part of the Ozark region cut off from Missouri by the Mississippi River. They are formed of Devonian cherty limestones. The part of this upland ridge between Olive Branch and Jonesboro forms the western edge of the modern Cache River watershed.

During Mississippian time, clear, warm, shallow seas invaded the Mississippi Valley. Relatively pure limestones were deposited over enormous areas. South-flowing rivers built deltas into the

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* The geologic information in this section is taken from several sources, particularly from the field trip guide leaflets prepared by the Illinois State Geological Survey (Cote, Reinertsen, & Wilson, 1966; Odum, 1964; Reinertsen, Berggren, & Killey, 1975; Reinertsen, Masters, & Reed, 1981).

sea, much like the present-day Mississippi River delta in Louisiana. This delta front shifted back and forth as the shoreline fluctuated, and the continually changing water depths produced striking, lithological variations that can be seen in exposed cross sections of the formations today. Features such as pebbly zones, ripple marks, crossbedding, and oolitic zones present in the sandstones and limestones indicate that they formed in high energy environments. Regular alternations of sandstone, shale, and limestone formations were laid down, each alternation beginning with a deposition of basal sandstone, then shale, and finally a deposition of limestone. Thin coal seams indicate times when the sea withdrew and plant debris accumulated in freshwater swamps. Mississippian age bedrock is exposed over most of the gently rolling to hilly parts of the upper Cache River watershed. These formations commonly form south-facing cliffs and steep bluffs along the northern margin of the Basin.

During the latter part of the Paleozoic Era, Pennsylvanian seas covered the area and deposited thick layers of sandstones. It was during this period that the coal bearing strata were laid down, most of which have been eroded away in the Cache River watershed area. Pennsylvanian age sandstones cap the high Greater Shawnee Hills ridge that crosses Southern Illinois and forms the northern boundary of the Cache River watershed. These formations are cliff-formers, and because of the general northern dip of the bedrock, vertical south-facing bluffs create a stair-step profile in a north-south cross section. It was during the Mississippian and Pennsylvanian times that the amphibians were prominent and that early land plants became common.

Following Pennsylvanian time, there was considerable movement of the earth's crust. The Ozark area (to the west of the Cache River Basin) was uplifted, and the Illinois Basin (to the north) was depressed. The major faults crossing the area (mostly in parallel lines trending northeast-southwest across southern Illinois and into Kentucky) developed during this time. There was a long period of erosion when the wind, weather, and streams wore down the irregular surface to form a nearly level plain. The low chert hills in present-day Alexander and Union counties were particularly resistant to that erosion and remained higher than the plains to the east.

A bedrock trough, called the Mississippi Embayment Syncline, formed as movements of the earth's crust caused the region between the Ozark Dome (on the west) the Nashville Dome (on the east), and the southern margin of the Illinois Basin (on the north) to subside.

It gradually deepened southward toward the Gulf of Mexico, allowing an arm of the sea to advance northward and inundate the southern tip of Illinois at least twice during Cretaceous time and twice during Tertiary time. This was between 90 million and 20 million years ago. The Cretaceous and Tertiary strata deposited during these invasions filled the Embayment trough and formed a wedge-shaped body of unconsolidated gravels, sands, clays, and silts, that gradually thickened southward (now varying from a thin erosional edge in southern Illinois to more than 3000 feet in Tennessee). These deposits form the low rounded gravel hills south of the Paleozoic bedrock outcrops, and are most prominent south of the Cache River Basin in the present-day counties of Pulaski, Massac, and Pope. The Cretaceous System is a part of the Mesozoic Era known as the age of Reptiles. It was during the Cretaceous that the flowering plants were perfected. The Tertiary System is the earlier part of the Cenozoic Era known as the Age of Mammals. It was during the Tertiary period that the deciduous trees developed, including the taxodiums, ancestors of the modern bald cypress. This period ended between two and three million years ago. As the sea withdrew from this area for the last time, the region was uplifted, and erosion has continued to the present.

The later part of the Cenozoic Era is known as the Pleistocene Epoch, commonly referred to as the Great Ice Age. Beginning about a million years ago, extensive continental glaciers covered northern North America and most of Illinois. There were four major glacial advances, and the third, the Illinoian, reached the farthest south, barely entering present day Johnson County and the northern edge of the Cache River watershed. Early in the Pleistocene, the Ohio River was formed by streams diverted and combined in a westerly course south of the ice front. This was the stream that flowed through the Cache Valley. Outwash, composed of silt, sand, and gravel, was deposited by sediment-laden meltwater streams pouring away from the ice fronts, during both advance and waning of the glaciers. The valleys of the Mississippi and Ohio rivers were greatly enlarged during times of flooding, but during times of little meltwater flow, they became filled with outwash. Near Cairo, deposits accumulated as much as 250 feet thick. Near the end of the last glacial advance, the Wisconsinan, a great melt-water flood caused major changes in the channels of the streams. Most geologists believe that it was during this time, perhaps 13,000 years to 10,000 years ago, that the Ohio was diverted from its course across southern Illinois into a river channel to the south. This left the abandoned Cache Valley to fill with alluvial material to its present level. The Ohio established its present

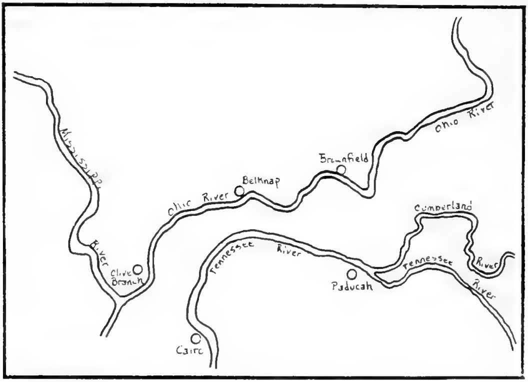


Figure 2. Southern Illinois drainage as it may have appeared during the early part of the Great Ice Age, perhaps 500,000 years ago

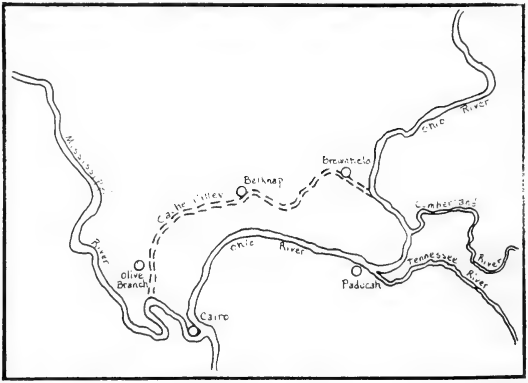


Figure 3. Southern Illinois drainage as it appears at the present time

course in the lower valleys of the Cumberland and Tennessee rivers, but it has continued to occasionally use the Cache Valley as an overflow route, and did so as recently as 1937.

The unconsolidated clays, silts, sands, and gravels that form the low rounded hills south of the Cache River Basin have been reworked by the changing courses of the major rivers and mixed with glacial outwash and recent alluvium.

The upland and terrace soils in the area are also a result of glaciation. Wind-blown silt, called loess, was deposited as a blanket-like cover over the bedrock and alluvial materials in most of the region. This silt came from the floodplains of the Mississippi and Ohio rivers where great dust storms occurred during periods when they were dry. Thicknesses as great as 50 feet are known along the Mississippi Valley, but the loess thins to the east and is commonly less than 15 feet in the uplands of the Cache River Basin. A great deal of the present day alluvium is derived from eroded upland loess.

During the Pleistocene, as the sediment material carried by the glaciers aggraded the Cache Valley, it blocked tributaries forming slack water lakes. The ancestral Cache River was blocked near the present site of Forman to form a lake upstream, and the Little Black Slough-Heron Pond swamps represent a Pleistocene Lake remnant in its waning stages (Graham & Hughes, 1984).

After the Cache Valley was abandoned by the Ohio River, drainage continued to flow westward. The present day Bay Creek was once part of the headwaters of the Cache River system. Gradually, sediment deposited in the Basin by the Cache headwaters formed a whaleback across the Valley near the present site of Reevesville. This low ridge divided the drainage, causing the water to the east to flow that direction into the Ohio near the present site of Bay City. Its main stream is now called Bay Creek.

West of the Reevesville divide, the water continued to flow westward in the Basin. The bottomland sloughs joined with the upper Cache River at a point near the present site of Belknap to form the lower Cache River. It continued to flow west in the Basin and was joined by other streams flowing southward out of the hills to move sluggishly across southern Illinois to near the present site of Tamms. It then turned south, flowing very near one of the Mississippi River bends, thence turned east to enter the Ohio River above the present site of Cairo, about 5 1/2 miles above that river's junction with the Mississippi.

In its primitive state, the Cache Basin was frequently flooded, and thousands of acres were inundated from six to eight months of the year. There were many inlets, especially streams from the upland hills along its north border, but few outlets. There was very little fall, and many of the swamps had no drain, the water simply stood there, partially evaporating during dry periods. High water in the Ohio River often held back the Basin floodwaters and prevented the lower section of the Cache River from draining (Report of Cache River Drainage Commission, 1905).

During the last 10,000 years, there have been changes in climate that affected the Cache River watershed character. Extremely wet periods resulted in accelerated erosion of the uplands. At times, the Basin resembled a huge shallow lake, but it was continually filling in with sediment washed from the adjacent hills. Thick layers of organic debris accumulated in the bottoms of the swamps. During drought periods, the lakes and ponds were reduced in size and much of the swampland was dried, allowing the organic materials at their bottoms to be oxidized. Occasionally overflowing into its old channel, the Ohio River would scour out much of the accumulated silt and debris, and in places the swift currents would wash away stands of trees leaving deep openings to later become linear open ponds. Aggradation exceeded degradation though, and overflows by the Ohio became less frequent. The huge lakes were reduced to relatively small remnants. As the general elevation of the Basin was raised, the water was spread out to create large areas of flat shallow swampland and wet floodplain forest.

Natural Character Just Prior To Settlement *

About 1800, just prior to the time of earliest settlement, probably 80% of the Cache River watershed area was densely forested. There were linear openings along the south-facing bluffs north of the Basin, and prairie glades on bedrock outcrops. Grassy, semi-treeless barrens covered areas of several square miles in size on the gravel hills to the south. In the Basin bottomlands, the swamps, low ridges, and higher terraces were covered with dense stands of timber except

* Most of the information in this section is taken from the eyewitness descriptions of the landscape recorded in the Public Land Survey field notebooks (Public Land Survey, 1804-1850). Some interpretations are based on the present character of natural areas in the region.

where the water was deepest. The prominent wetlands that were more or less open were given names by the early settlers that reflected their natural character, names such as "The Scatters", "Grassy Slough", "Long Reach", "Round Pond", "Cypress Pond", "Fish Lake", "Long Lake", and "Horseshoe Lake". The plant and animal species inhabiting the region were as diverse as the varied types of terrain occurring in the region.

The Cache River began near the present site of Anna in what is now Union County. The small tributaries of its headwaters had rocky beds with many gravel bars. In places, the crooked, high-gradient streams flowed over solid pavements of bedrock and meandered against sheer sandstone cliffs. The waters were almost always clear, but a lot of leaf litter and woody debris was carried downstream during storms to form small temporary dams where it lodged against piles of sandstone boulders. Springs were frequent in the hills along the bases of the bluffs, and they helped maintain a permanent flow in many of the small water courses.

The topography along the upper Cache as it flowed eastward was hilly with lots of rock outcroppings, small cliffs, and sandstone overhangs. This part of the watershed had an upland timber cover of oaks, hickories, ashes, and maples. Beech, tuliptree, and walnut were locally common in the hollows. Larger tributaries had developed small floodplains on which grew tall sweetgums. Runoff was fairly rapid because of the steep slopes, but the water courses were so crooked and choked with rocks and fallen logs, that it often took three or four days for water to get from the upper part of the watershed to the lower Cache in the Basin. The main channel of the upper Cache in this region was commonly about 65 feet wide.

South of the present site of Vienna in what is now Johnson County, the upper Cache River was joined by its largest tributary, Dutchman Creek. It flowed generally south from that point to where it emptied into the Basin near the present site of Belknap. The river flowed through a sizeable swamp before entering the main valley, and the largest pond in this bottom area along it became known as the Little Black Slough. Other swamps and ponds occurred along the Cache upstream as far as the present Union-Johnson County line. Cypress was the dominant tree species in these wetlands. Local sites had dense stands of tupelo, but this species was not so abundant here as in the Basin proper. Other trees common in the low wet woods were swamp chestnut oak, Shumard oak, Shumard oak, kingnut hickory, American elm, swamp red maple, and sweetgum. The main channel of the Cache still

did not average more than 65 feet wide, and at several points, it was less than 50 feet. The river meandered with many hairpin curves, and it was often filled with logs and driftwood that almost dammed its flow. It was continually but slowly cutting across necks of land to form new channels, leaving dead sloughs and oxbows. The channel was generally wide and shallow with a fairly flat bottom and rounded sloping banks. In places, there was some active erosion along the outside banks of steep curves, but under most conditions, the banks were stable and the water had little silt. The swamps and ponds were perched on the banks slightly higher than the bottom of the river channel, but the river usually overflowed its banks several times a year and covered much of its floodplain in this area.

The river slowed drastically once it left the hills and entered the low, nearly level bottomland of the Basin. At a point southeast of the present site of Belknap, it was joined by a sluggish stream from the east, later called the Big Black Slough Ditch. This stream had a watershed that extended fifteen miles (straight-line distance) east to near the present site of Temple Hill in Pope County. Most of its area was low wet swampland, including the largest contiguous cypress-tupelo swamp north of the Ohio River. This swamp, referred to by the early settlers as the Black Slough (or Big Black Slough to distinguish it from the Little Black Slough), covered 11,000 acres. It was variously described at different points by the Public Land Surveyors in 1807 as being a "Lake", a "Pond", "Inaccessible", and as having "water too deep to wade". Some section lines were surveyed on the ice, but several lines were never run. This large swamp was mostly densely forested with cypress and tupelo, but there were a few open areas of deeper water, places that were called by names such as "Long Lake", "Fish Lake", and "Round Lake" by the early settlers. The water never drained nor dried up in this swamp, even during the driest years. During periods of heavy rainfall, the water from upper Cache River would back up into this low part of the Basin (Rolf Survey, 1891-1892).

After receiving the water from the Black Slough Ditch, Cache River turned to flow west in the Basin. Below the present site of Belknap, the channel was divided up into scatters, a braidwork of small channels, ten and twelve feet wide and two to three feet deep. Much of the channel way for a distance of nearly twelve miles (between the present site of Karnak and Ullin) was made up of wide shallow swamps and deeper open ponds. The fall in that distance was less than six inches. That part south of the present site of Perks had one of the two largest areas of open water in the Basin. Local names such as "Long Reach", "Short Reach", "Eagle

Figure 4. Major "lakes", ponds, and swamps about 1807 as mapped by the Public Land Surveyors in the Cache River watershed: some of the swamps shaded at the very east end probably drained into the Bay Creek system

Pond", and "Goose Pond" were given to different parts of this wetland region by the early settlers. Here, cypress was the dominant tree in the swamps, and there were scattered large individuals in the edges of the ponds where the water was deeper. Trees of all species grew larger in the swamps, on the low ridges, and along the natural levees of the channel ways in this region than in the bottomlands of upper Cache River. Cypress and tupelo trees, four and five feet in diameter were common. Huge elms and swamp maples with widespread crowns made up half the canopy cover and were important members of the wet floodplain forest community (Report of Cache River Drainage Commission, 1905).

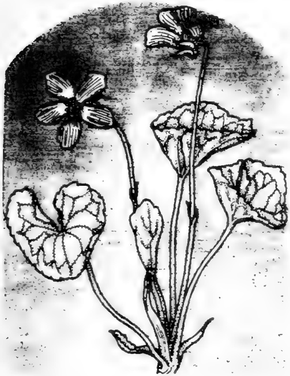
Three major tributaries entered the Basin and flowed into the Lower Cache River in this region. The two from the north, Big Creek and Cypress Creek, drained large areas of the Shawnee Hills. They had extensive swamps along their winding channels. The broad wet flatwoods along these streams had some of the finest stands of sweetgum timber in the Midwest. One major tributary entered the river from the south, Limekiln Slough. It had a sluggish flow and drained the extensive swamps along the south edge of the Basin. Here was one of the few places in the Basin where pecan was common.

From an area near the present sites of Ullin and Tamms, the Cache River turned to flow south, developing an extremely crooked course. Swamps and wet woods bordered it in many places and were commonly enclosed by its bends. A considerable amount of spring water flowed into it from sandy seeps and contributed to the river's flow. Two major tributaries, Mill Creek and Sandy Creek, entered the Cache in this region. These streams had their headwaters in the rugged Ozark Hills. Upland timber here was diverse with mesic stands of large tuliptrees and beech trees in the ravines. Slopes were steep but tributaries flowed over wide beds of cherty gravel, and their waters were always clear. There were swamps of 200 to 300 acres along the downstream portions of these tributaries in the Basin.

In the vicinity of Unity, the Cache River was bordered by the gravelly Tertiary hills along its left (east) bank. Here, beech was a common tree in the ravines and small valleys. Scattered huge cypresses grew on the banks of the main stream and along the natural levees of the sloughs and oxbows. To the right (west), a huge bottomland swamp and pond, Horseshoe Lake, covered nearly 3,200 acres. Although the wetland in this area extended westward almost to the Mississippi River, it drained eastward, (by means of Lake Creek), into the Cache. Horseshoe Lake had a relatively large

area of open water. Cypresses and tupelos lined the shallow waters along its edges.

After coming within 1/2 miles of a bend of the Mississippi River, the Cache turned east again, crossed the narrow peninsula above the present site of Cairo, and entered the Ohio River about 5 miles above the Ohio's junction with the Missisippi River. This section was low and swampy with scattered groves and stands of huge cypress trees. There were many abandoned sloughs and oxbows.



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Use and Disturbance History

Early Settlement

There are no records to prove just when the first white man viewed the Cache River area, but it was probably before 1670. There is a legend that the Spanish explorer, De Soto, reached southern Illinois as early as 1542 and built a fort on the Ohio River bank, but there is no evidence to prove this. The Ohio and Mississippi rivers provided easier access to the southern Illinois region than to much of the interior west of the Appalachians, and early adventurers commonly used river craft to search for new hunting grounds. The first French explorers to record their visits to the area were Marquette and Joliet. They travelled down the Mississippi River in canoes and passed the mouth of the Ohio River in 1673. They probably did not stop or actually see the Cache River (Bakeless, 1961).

Sometime after 1700, perhaps as early as 1711, the French built a fort along the lower Ohio River. Facts about its construction and early occupation are vague, but it later became known as Ft. Massac. It was the only site of European settlement in the southern Illinois region for many years. There was a settlement established even earlier, but it didn't last long. Charles Juchereau and Father Mermet constructed a tannery and small mission at the head of the "Grand Chain of Rocks" in 1702. It was on a small hill near the present mouth of the Post Creek Cutoff. The tannery was burned, and the 150 inhabitants were all (except for Juchereau who escaped to tell the tale) massacred by the Indians in 1704. The tannery was abandoned until 1812 when a British fort, Wilkinsonville, was built on the site (Moyer, 1944).

Itinerant hunters and trappers were the first white men to actually travel across southern Illinois and paddle up the Cache River. A few knew its paths and waterways quite well even prior to the Revolutionary War, for it was a hunter that guided George Rogers Clark and his little band of soldiers across the swamps and hills of the Cache River watershed on their way to Kaskaskia in 1778. These rugged, half-wild pioneers lived like the Indians. They built no permanent homes, cleared no ground, and left few permanent marks upon the area. It is probable that these early woodsmen depleted certain game species, such as the buffalo, the elk, and the beaver. The Indians continued to use the area as a hunting ground until about 1800. The roving bands found plenty of fuel,

Figure 5. Part of Meish's map of Illinois in 1818

good water, and an abundance of food.

After the Revolutionary War, traffic on the Ohio River increased. Canoes, dugouts, and frail rafts carried hardy explorers downstream to southern Illinois. They were continually searching for more game and fertile new lands. Temporary camps of settlers were established along the banks of the Ohio and a short distance up the Cache River as early as 1795 (Perrin, 1883).

In 1803, two men, Abram Hunsaker and George Packer, came down the Ohio and up the Cache, hunting and fishing. They camped near where Jonesboro now is located in Union County. "The next morning, they killed a bear and a turkey gobbler, and were so delighted with the land of plenty, both of game and excellent water, that they built cabins to house their fanilies and became the first white settlers in the territory" (Perrin, 1883). Government survey crews began to survey southern Illinois immediately after its acquisition from the Kaskaskia Indians in 1803. Their plats and descriptions of the Cache River country provide an eye-witness account of what the region was like prior to significant disturbance. They noted that there were two "dwelling houses" on the Ohio at the mouth of Bay Creek in 1806. In 1795, William Bird first landed at Cairo, but he didn't return to enter land until 1818. A few families were living along the lower Cache River in 1812, for it was that year that all the residents were massacred by the Indians, save one man, who it is said escaped sorely wounded by swimming a wide bayou of the Cache (Perrin, 1883).

Some early land developers seemed always interested in improving boat access by deepening, snagging, and straightening streams. As early as 1819, there was an act of the Illinois legislature to dam the Cache River with the idea of making it a part of the great national highway for navigation. It is not known how much was actually done or how effective it was, but such damming activities met with a lot of local resistance from residents who hated the "miasmatic swamps" and waters which covered much good land. In 1824, two brothers traveled up the Cache from the Ohio River and camped at a spring along it in present day Johnson County. They figured that the river (Cache) would someday be an important stream for riverboat traffic and decided to settle there. They entered two sections of land and the property is still owned by descendents of that family, today (Marshall, 1970).

Although the better drained choice sites were soon settled, it was after 1900 before much of the Cache River bottomland was inhabited. Prior to 1835, most settlers were squatters. They put up a rough

Figure 6. Trees such as this 5-foot overcup oak were a formidable obstacle to the early settlers trying to clear land in the bottoms

Figure 7. Fires from land clearing operations sometimes burned across the swamps during periods of drought, and cypress trees that were hollow were often destroyed

Figure 8. Hollow trees burned like torches, and stumps sometimes smoldered under the ground for weeks

Figure 9. A view of an unchannelized section of the lower Cache between Johnson and Pulaski counties; water elm is the common shrubby tree along the banks; there are no steep eroding banks bare of vegetation

cabin, cleared a few acres for a truck patch, stayed a year or two, and then moved on. Just staying alive was not easy, and farming was basically subsistence farming. As one resident put it, "It was a good country for men and dogs, but powerful tryin on women and oxen." Many of the early residents were migratory, living and farming in the the bottoms after the spring floods subsided, and retreating to the hills to spend the winter. Being from the Appalachians, most were not accustomed to having things too nice and they were fairly content to stay that way. Struggling for mere survival took away most of the ambition they may have had when they got here. Clearing the land was extremely difficult where the forests were dense and the trees were huge. Many became discouraged and moved north to the rich fertile prairie lands where there were few trees to clear and where flood waters seldom destroyed their crops. A lot of the land in the hills of the watershed had thin soils that eroded quickly. Many farms in the Belknap area were worn out and abandoned before the Civil War (Marshall, 1970).

Agricultural activities have been a major disturbance in the watershed area since the time of earliest settlement. Partly because the upland sites were naturally more open (sizeable areas in the Pulaski and Massac County hills were barrens), those places with the thinnest and most erodible soils were frequently settled and plowed first. With little concern for saving the soil, the land was cropped until it washed away or became too poor to grow weeds. It was common practice when one farm wore out to then move to another, or as most farms had some timberland, a new patch of ground would be cleared to till. Farms were small, usually 40 acres or less, and by the 1920's, almost every upland forty in the watershed had a house and barn. A few wealthy landowners cultivated large fields in the bottoms, but the overall percentage of land that was cropped each year was relatively small. One resident at Forman remembered how hard his father worked, year after year, to tend one 15-acre field with a team of balky mules.

By the time of the depression years of the 1930's, the watershed was in bad condition. Many residents abandoned their farms, and those who stayed had little pride or were not able to properly take care of their soil and timber. Livestock, especially hogs, were often allowed to roam the woods. Streams were sometimes full of wallowing pigs on hot summer days. Gullies in fields became so bad, farmers could no longer cross them with mowing machines, and they grew up in bushes and briars. Timber was indiscriminately cut and sold for nearly nothing, sometimes not bringing enough to pay the taxes.

With the conservation programs of the New Deal, the creation of federal agencies such as the Soil Conservation Service and the Civilian Conservation Corps, land care improved. The Shawnee National Forest was created in 1933 and immediately began to buy worn out farmland and cutover timberland in southern Illinois. Their ownership and management improved the condition of the Ozark Hills in the Union and Alexander County parts of the Cache Watershed tremendously.

Still, the most serious agricultural impacts upon the area came after World War II. With the advent of tractors and bulldozers, farming methods changed. Farms became larger, and a greater percentage of the land was row cropped. More marginal land was cleared. Rougher land could be plowed and plowed much deeper than with horse power. Tractors could plow across gullies and small drainageways instead of having to go around. In recent years, the application of chemicals and fertilizers has changed the character of the soils. Weed killers and insecticides are now found in most of the streams. Silt has choked the springs and ditches and filled the swamps.

Farming has also been responsible for introducing many of the exotic plant species now so common throughout the watershed. Problem weeds, such as Johnson grass, have spread into much of the open bottomland in the Basin.

There were sawmills along the Cache as early as the 1850's, but the timber industry really began to boom after 1870, and logging became the most important means of livelihood. Logs were floated from the Big Black Slough swamps from as far upstream as the Enterprise School, about 3 miles south of New Columbia. An extensive network of ditches was dug in the Big Black Slough area to facilitate drainage as well as to provide better routes for floating logs. Main Brothers formed a separate corporation called the Cache River Drainage Corporation, and they did a lot of the ditch work in that area prior to 1920. Many millions of feet of timber were cut along the Cache by the Main Brothers Company until they ceased operation in the 1970's. According to company officials, they cut 2 million feet per year for 20 years in the Big Black Slough area alone. This was mostly softwood, species such as tupelo, sweetgum, tuliptree, cottonwood, and elm. Much of the forest land of the Cache that is left is still composed of groups of young trees filling in between the old oaks and hickories that were left. In general, little cypress was cut, except for local use, because there was little market for it. A lot of big oaks were left along the Cache River banks because they were species that didn't float well. Some

cypress was cut to use as floaters; a cypress log would be "pegged" or "dogged" to a heavier log so that it could be rafted to the mill. A large crew of employees annually cleared the banks, and snagged the main channel and tributaries of the Cache to keep them clear. Logs were cut and piled along the river banks to be rolled in when the water was high and the current just right. A boom across the upper end of the Post Creek Cutoff stopped the logs so that they could be diverted through a gate into the large sawmill pond at the mill site. Logs cut in the swamps were pulled out along "float roads" in long strings of two logs abreast, wired or chained together. In later years, strings of logs a half mile long were pulled out of the Little Black Slough with boats using gasoline engines. Trees in the swamps were normally cut out of boats and occasionally on the ice. Often the stumps would be 6 and 8 feet tall. From the higher ground and low ridges, the logs had to be skidded and piled along the ditch banks to wait sometimes for months for water levels sufficiently high to float them downstream. For many years, oxen were used in the Big Black Slough and Little Black Slough swamps, but from about 1920 on, they were replaced with mules and horses. Loggers set up camps and lived in the woods where they worked. As many as 40 teams of mules were kept at one time and stabled in the woods near Belknap while crews were working the timber in the Bird Springs area. It was after World War II before logs were moved to the Main Brothers mill by truck. Prior to that time, what logs weren't floated, had to be moved by team and wagon, and that was a slow process. Usually, only one log could be hauled at a time (if it were of average size), and a man had to be able to get from the woods to the mill before noon in order to have time to get back and get loaded before night (Main, 1980).

Although some of the larger lumber companies were selective in their logging operations, many were not. It was a general policy not to cut trees on Main Brothers land less than 24" in diameter at breast height, and loggers were instructed to leave one good large tree per acre as a "seed tree". Thus, much of their timber land maintained good stands that continued to produce high volumes even when logged repeatedly. A lot of timberland, though, was not just logged, it was devastated. The practice of only cutting the best (high-grading) gradually left poorly stocked stands that were almost worthless. Land clearing followed logging on most privately owned tracts, and even land worthless for farming was cleared of its timber if the owner could get to it. Large stands of trees were deadened and burned with little effort to salvage the timber. One tract of several hundred acres along the Cache near Belknap was girdled and deadened about 1900. Except for a few hickory removed for wagon

stock, the entire stand was left to die and was then burned. Most of that stand was made up of tall sweetgums, 36 inches in diameter (Orange, 1984).

But it wasn't the logging that was really responsible for the decimation of the Cache River forests, it was the drainage. From the time of earliest settlement, there were men who had high hopes for developing the prosperity of the area, men who envisioned a great agricultural and residential region. They saw that it needed only one thing--drainage. Many spent their lives promoting projects to drain the swamps and bottom lands. In the 1870's, a group of Chicago capitalists studied the feasibility of draining the bottoms in the Belknap area by cutting a ditch straight south to the Ohio River. Even prior to that time, there were local efforts to cut ditches to drain farmland. Sometimes the engineering was less than accurate, and following the construction of a ditch to drain one swamp in Pulaski County, the water ran back from the creek into the swamp instead of the direction desired (Perrin, 1883).

Drainage efforts were particularly encouraged by the Swamp Land Acts of 1849, 1850, and 1860. Under these federal acts, millions of acres of swamp and overflow land in 15 states were conveyed to the respective states to facilitate reclamation of the land for agricultural use. These lands were eventually transferred to the counties to be sold with the proceeds thereof to be used for drainage. Thousands of acres were so transferred to the counties of Pope, Massac, Pulaski, and Alexander. Four drainage districts within the Cache River watershed were in existance prior to 1904, three in Pulaski County, and one in Johnson County near Belknap. Some efforts were made at drainage within these districts, but little real benefits were realized.

In 1903, an act of the Illinois legislature authorized and funded a survey of the Cache River to determine a feasible way to drain and reclaim large areas of overflow lands within its watershed. The results of this survey were published in a report recommending that a cutoff ditch be constructed from a bend of the Cache River near Karnak, straight south to the Ohio River. This ditch was to short-circuit the natural flow and carry the upper Cache water directly into the Ohio by a much shorter and faster route than could be possible by improving the existing channel. The Cache River Drainage District was organized in 1911 to sponsor the project. This work was accomplished between the years 1913-16, essentially as recommended. The ditch partly followed a tributary of the Cache, Post Creek, and it became known as the Post Creek Cutoff. The results of this effort have been dramatic. Gradually,

Figure 10. Looking south along a ditch cut across a low ridge to drain farmland straight south into the Cache, one mile west of Cypress Creek Ditch; photo was taken one year after construction: note bank erosion

Figure 11. Railroads were built across the ponds and swamps, and their embankments modified drainage: originally, there were open trestles a mile or more in length across the lowest sites, but now those are mostly filled; the above view is the Burlington Northern were it crosses Heron Pond

the ditch was deepened and widened by erosion so that it not only carried the upper Cache water, but some of the lower Cache water began to flow backwards into it, as well.

Supplemental drainage work throughout the watershed was accelerated. Swamps and ponds rapidly dried up. The Big Black Slough no longer received the tremendous volume of backwater from the upper Cache, and with a good outlet, it drained alomst completely. Large scale land clearing, tilling of farm fields, and cleaning of stream channels were all activities that concentrated the water flow, increased the runoff, deepened the channels, and contributed to the instigation of severe erosion along the natural and unnatural stream banks. On the upper Cache, crooked sections of the channel were bypassed with ditches.

The lower Cache River, downstream from the Post Creek Cutoff, was directly affected only a short distance by that ditch, but other drainage projects were soon instigated to "improve" that downstream region. Straight ditches were dug to eliminate loops, bends, and curves on the main stream. One of the largest tributaries, Big Creek, was drastically changed by dredging and channel straightening. A straight ditch was cut from a bend in Cypress Creek, directly to the Cache River, causing it to abandon its original longer course. In 1912, channel straightening was initiated along the Cache below Ullin for a distance of nearly two miles. In 1930, the Illinois Division of Waterways began "improvements" which consisted of channel deepening and straightening from just upstream of the mouth of Mill Creek to a point upstream of the mouth of the Boar Creek. The Division also made most of the channel "improvements" along Big Creek and constructed five check dams there in the 1930's. The Illinois Division of Waterways also constructed the channel modifications along Dutchman Creek on upper Cache. Cypress Creek was straightened and diverted by local interests. Federal projects funded the construction of levees to protect the Mounds-Mound City area, and the lower section of the Cache River was cutoff by a diversion ditch into the Mississippi River near Beech Ridge. This channel was constructed in 1950 by the Army Corp of Engineers under authority of the Flood Control Act of 1938. The Corps of Engineers also built the levee from Karnak to Belknap along the Forman Floodway. Work was begun in 1949. This levee cut across the old river channel near Karnak and helped to further divide the upper and lower Cache watersheds. About the time that the Post Creek Cutoff and the Forman Floodway were being constructed (1912-1916), a small earth levee was constructed near Reevesville along the divide between the Cache River and Bay Creek watersheds. In the 1950's, the Corps of Engineers built much higher levees in this area to divide those

basins. Some early dredging work was done between Karnak and Perks placing the spoil on the south bank where it formed a low uneven levee. In section 8, near the old site of Rago, lateral ditches were cut into the Cache to drain the swamps along both sides of the river. In the 1960's, and again in the 1970's, draglines were used to dredge sections of the river from south of Perks, east to Route 37. The timber was cut along the banks in several places to move the machines. The spoil placed along the north edge partially blocked old oxbows such as Short Reach.

Industrial development, other than the sawmills and wood products industries, has had little effect on the Cache River Watershed area. The towns and villages have remained small and have never had large factories.

The railroads have had a great influence upon the area. The Illinois Central was completed to Cairo in 1856. The conrail (or Big Four) was originally known as the Cairo and Vincennes Railroad. It was constructed across southern Illinois, and south to Cairo in 1870-72. The St. Louis, Alton, and Terre Haute line was built through the eastern part of the area in 1888-89. It passed through Big Bay and Reevesville on its way to Metropolis and was later acquired by the Illinois Central. The Chicago and Eastern Illinois line was built in 1900. It passes through West Vienna, Karnak, and Boaz on its way to Metropolis. The Chicago, Burlington, and Quincy Railroad was built between the years 1905-1910. It passes through the Little Black Slough and Heron Pond swamps near Forman. These railroads were a major factor in opening up the country.

The railroad embankments slightly modified drainage in the low flat Cache River bottoms. Although the original tracts had long trestles, the embankments acted as dams across many small sloughs and diverted runoff into larger streams. The Illinois Central embankment helped to divide the Bay Creek and Cache River watershed between Reevesville and the village of Big Bay. The C B and Q track was constructed across Little Black Slough, Heron Pond, and across the broad swamps of the Big Black Slough in the Basin proper.

In building the railroads across the swamps, tracks were laid on crossties held by beams supported by piling driven into the ground. Car loads of dirt borrowed from the nearest uplands were than pushed out on the tracks and dumped to fill beneath the ties and form the solid embankments. The original railroad engineers left long open trestles across the broad sloughs and larger streams, many a mile or more in length. Gradually, railroad maintenance crews filled these with ballast until smaller ones were closed up and the longer

ones were reduced to spans just long enough to cross channels. When the Ohio flood waters crossed the Basin in 1937, these trestles were washed out to very near their original length. The embankments were also damaged at many other places, as well. Railroad trestles often blocked debris and caused huge drifts that impeded natural flows.

Roads have also had an impact upon the natural drainage of the area. For many years, the dirt roads were so frequently wet and muddy, travel was almost impossible during the winter. In the lowest places, great numbers of logs were laid crossways and next to each other to form miles of what were called "Corduroy Roads". Road improvement and maintenance was a constant and continual public activity and expense. Gradually, road beds were raised, bridges replaced fords, and rock material was hauled in to fill the mud holes. In the hills, roads followed ridgetops and drainage divides as much as possible. In the bottoms, roads were often built on levees or next to railroads. In places where roads crossed drainageways and sloughs, the embankments formed low dams to impede the natural movement of water. Culverts and bridge openings were seldom big enough to handle the water flows during times of flooding. Between Johnson and Pulaski counties, the original channel of the Cache was filled with cypress logs and dirt where the Belknap-Karnak road now crosses. The lower Cache water that tended to flow back east, was diverted by means of a ditch along the railroad to flow past the Main Brothers sawmill and on through a ditch (now through culverts under the levee) into the Post Creek Cutoff (Main, 1980).

The natural character has been considerably affected by non-native plants. Aggressive aliens such as Japanese honeysuckle, Johnson grass, and fescue have spread into the forests and natural openings. Pine trees have been extensively planted on National Forest lands in the uplands, and some of these non-native species are spreading into natural communities. Most of the serious agricultural weeds are exotics. In the early days of farming in southern Illinois, crops planted in newly cleared bottomland hardly needed tending. Corn was planted by hand amoung stumps in fields 100 acres in size Yields of 100 bushels per acre were not uncommon on the black rich soils without a single plowing and there were no weeds. Now, there is scarcely an opening anywhere in the area that doesn't have fescue, bluegrass, Johnson grass, honeysuckle, or some other exotic.

Diseases and insect infestations followed settlement that have seriously affected the native vegetational communities. One example is Dutch Elm disease. It has practically wiped out the old elms that were once such an important member of the bottomland forests. It now appears that the sycamore may be headed for the

same fate.

The insects that affect forest trees, such as the epidemics of defoliating caterpillers, may be native but more serious and widespread today without enough natural predators to keep them in control.

An important member of the swamp community today is the beaver. Although it surely did occur along the Cache River prior to the coming of the white man, it was probably not abundant. There are only a few vague references to native beaver populations in the literature, and the species was essentially gone by 1850. Cory (1912) and Forbes (1912) both give references to beaver being in southern Illinois about 1900, but those records refer to observations along the Ohio and Mississippi rivers. In the Cache River watershed, there were probably more beavers on the upland streams where preferred food was more plentiful than in the cypress swamps. It is doubtful that they influenced drainage in the Cache River Basin to any great extent.

Beavers have had a significant impact upon bottomland forests along the Cache since their reintroduction in 1935. They were building dams on Bay Creek as early as 1946, and 1960 they were common along the Cache in the Little Black Slough area. Their dams across the natural drains at Heron Pond raised the low water level in that swamp and caused 20 to 30 acreas of timber surrounding the cypress stand to die. They continue to block drains in the Little Black Slough area, especially at railroad culverts. Several sizeable tracts of timber have been killed in that area. Beaver are increasing in numbers in the lower Cache area. They construct dams to try and hold water in the sloughs, and during dry seasons, they dam the main channel of the Cache at natural drifts or where the stream is silted. During the summer of 1983, their dams helped keep water in the Long Reach and Short Reach areas when the rest of the swampland was dry. Since about 1980, beaver dams have helped maintain water in the swamp at Heron Pond. Here, gullies are threatening to drain the swamp water into the Cache.

Early records are scarce, but there are a few written reports of the native wildlife in southern Illinois to help give us a picture of what it must have been like in primeval times. Joliet and Marquette mentioned that they found geese and ducks at the mouth of the Ohio River, and that they made no effort to fly or swim away from them. They said that the wild turkeys paid them no attention. Jacques Gravier, a Jesuit missionary, said that he saw 50 bears in a single day near the mouth of the Ohio in 1688. Reports such as this were probably exaggerated or unusual, but bears were

evidently common. Several early travelers mention the brightly colored Carolina parakeets in the cypress swamps. Enormous flocks of passenger pigeons roosted and fed in the area, sometimes eating all the mast in the woods. A visitor to the region in 1810 described a willow grove near the mouth of the Ohio "40 acres in extent so filled with pigeons, the branches were broken off and large saplings were bent to the ground." In that same year, Audubon visited an Indian camp at the mouth of the Cache River. He said that they were picking up pecans and hunting swans. Deer were common, although probably not in the numbers that occur in the area today. There were a few elk in the barrens and glades, and there is a report of one being killed in Massac County as late as 1850. The wolves left with the deer, elk, and buffalo, and were about gone by 1900. Cougars were reported until after 1900. An elderly resident (who died in 1984) remembers his father telling of seeing a "panther" in a large tree along the road that now leads to the Heron Pond parking lot. It is difficult to estimate the numbers of squirrels, raccoons, and swamp rabbits, but they must have been common and widespread throughout the region (Bakeless, 1961).

Hunting, trapping, and fishing were serious activities in the Cache River Basin for many years. Valuable fur animals, such as the beaver, mink, and otter, became scarce. The deer and elk disappeared. The few bears, wolves, and cougars that didn't leave with the deer, were hunted to extinction because they were feared and considered to be nuisances. The buffalo were slaughtered for their hides. The Carolina parakeets were shot because they reportedly damaged crops. The passenger pigeons were mercilessly hunted with guns, poisons, and dynamite. The settlers didn't like them because they ate the acorns in the woods, and their hogs starved to death. The large ivory billed woodpeckers, once so characteristic of the cypress swamps, disappeared as the virgin groves were cut down.

Until about 1916, market hunting was legal in Illinois, and for almost 30 years after the coming of the railroads, wild game species were killed, packed in barrels, and shipped from several different depots in the area. The main markets were in Chicago and St. Louis. Ducks and swamp rabbits were the most common commercially hunted species. One man who hunted in the Cache River Basin between 1900 and 1915 said that he usually got 3¢ apiece for big ducks and 2¢ apiece for little ducks. He said that he almost always made more money than those who were working on farms or at the sawmills. On an average day, a hunter in the Reevesville area shot a box of shotgun shells at swamp rabbits. He commonly killed 23 rabbits per box. They brought between 3¢ and 4¢ apiece.

After World War I, the wild game species of almost all species began to decline in southern Illinois. The wild turkey was gone by 1920. The waterfowl populations were more concentrated, and their numbers fluctuated from year to year. Rabbits began to die of diseases, and their numbers dropped drastically. There were still local sites where hunting was usually good, but the days when huntable populations of game species were spread out over the entire region were gone. Soon, hunting became primarily a sport instead of a business. A new type of hunter developed as wealthy businessmen from northern cities came to hunt in the southern Illinois swamps. Railroad companies ran extra trains in the fall of the year to bring hunters from Chicago to the Black Slough area in Massac County. There were dozens of hunting cabins along the Cache in the Long Reach area south of Perks. One owner there rented as high as 40 boats a day. The game laws were not always followed closely, and individual hunters sometimes killed as many as 40 ducks in one morning of shooting. Horseshoe Lake, in Alexander County, was a noted duck hunting area prior to 1928, but after the state constructed a dam to raise the water level, geese began to winter there instead of on the sand bars along the Mississippi River. It soon became known as the "Goose capital of the world". Waterfowl numbers held fairly constant through the 1940's, but during the 1950's, they dropped to alarmingly low populations. The hunting pressure fell off as the game disappeared. Now, there is relatively little duck or goose hunting in the area except near the state regulated refuges at Horseshoe Lake and Mermet Lake.

Many native plants are now rare or becoming scarce. A few, like the medicinal plants, have been depleted by collecting. Digging ginseng for sale was a common summertime occupation for trappers in the Cache area. Now, it is almost wiped out in the area, although a few residents continue to hunt for it every year. Nearly every description of the early vegetation in the Cache bottoms mentions cane. The Public Land Surveyors found canebrakes a mile across. The most extensive were along the lower Cache between Beech Ridge and Mounds. These canes were more than an inch across and grew over 10 feet tall. The original canebrakes didn't last long. Settlers found that where the cane grew thickest, the land was best for farming. Several early writers mention that livestock wiped out much of the cane before fencing laws were passed. Now, the patches that are left seldom seem to do well, and it is difficult to find a cane large enough to make a fishing pole.

The native grasses and forbs that originally grew in the barrens south of the Basin are now scarce. Undisturbed barrens sites are

practically all gone. Species common on the prairies to the north grew in these brushy barrens, grasses such as little bluestem, big bluestem, Indian grass, and wild rye. Forbs, such as blazing stars, sunflowers, and silphiums were characteristic. Cultivation has almost completely wiped out this natural community, but some remnants are still left along Illinois Rte. 45 north of Metropolis.

The willow oak is a rare tree this far north. It was once common south of the Cache River Basin, and a few scattered trees are left in the Mermet area, along the Post Creek Cutoff, and along Limekiln Slough. It has been almost wiped out by land clearing and logging.

Present Character

Landscape

The Lower Cache River Swamps Natural Area is a low depression on the alluvial plain of the Cache Valley, and is within the Coastal Plain Physiographic Province. This valley that extends from east to west across southern Illinois is a prominent and impressive physiographic feature in the Midwest and is probably an abandoned channel of the Ohio River. The natural area includes a section of the Cache River, an underfit stream that now occupies the valley, and is mostly flat with extensive forested swamps and open ponds. Some better drained flatwoods are included in one area north of the river. Here, there are low ridges and shallow swales typical of much of the cleared farmland in the Basin. The natural area boundaries generally follow the edges of the present timber, and in many places these edges also follow the low terraces that border the swamps. The river and its bordering swamps have been pushed to the south side of the broad valley in the west half of the natural area, and Cretaceous gravels that form the low hills to the south overlie limestone bedrock at its south edge. The Cache River is shallow and flat-bottomed with low banks except where it has been deepened and leveed by dredging. In the deepest part of the area, south of Perks, the channel is wider and is bordered by backwater sloughs and old oxbows. There is little fall throughout the area, and water flow is sluggish. Silt is deep in the channels and depressions.

Geology

The Cache River and its bordering swamps within the natural area corridor are mainly bedded in recent alluvium. In places in the valley, these alluvial sediments are 180 feet deep, but in the west half of the natural area, they are not nearly so thick. Mississippian limestone outcrops along the south edge of the natural area near the mouth of Limekiln Slough. Here are several springs that flow into the river from the base of the gravel hills.

Hydrology

The natural area receives most of its water from three tributaries, two that enter from the north, Big Creek and Cypress Creek, and one that enters from the south, Limekiln Slough. Another smaller stream,

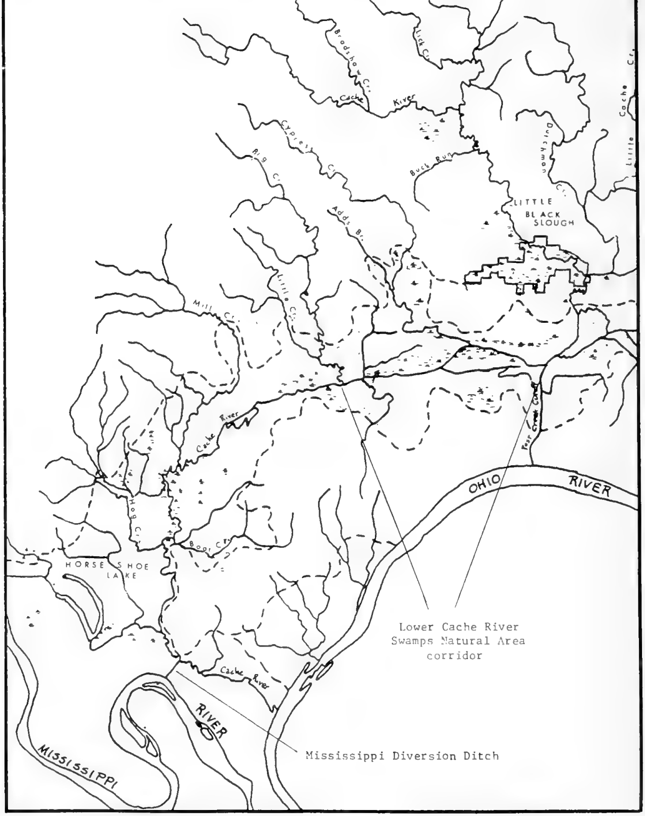

Figure 12. Cache River and its major tributaries showing location of Lower Cache River Swamps in relation to state properties at Little Black Slough and Horseshoe Lake; dashed line is boundary of bottomland

scale: 1 in. = 5 mi.

Kitchell Slough, also drains into the area from the south. Big Creek and Cypress Creek have both been drastically changed by diversions, channel straightening, and dredging in their bottomland sections. Both now empty by shorter routes directly into the Cache River. This part of the Cache Valley is poorly drained because it is low and flat with little fall, and runoff enters much quicker than it can leave. Backwater from the Mississippi River does not get upstream as far as the natural area, but it can get up almost to Ullin and does slow drainage in that direction. Prior to the drastic drainage changes associated with land clearing, channel straightening, leveeing, and the construction of the Post Creek Cutoff, water entering the Basin from upper Cache and its tributaries had long winding courses to follow, and it sometimes took several days for it all to get to the natural area. The straightened sections and cutoffs have now shortened the flows of these streams by many miles. Within hours of the beginning of a rain, water from the uplands is entering the natural area. Water from the hills all the way to Anna (12 miles to the north) rushes down the straightened channel of Big Creek to enter the Cache just west (downstream) of the natural area. At the same time, water is coming down Cypress Creek from nearly as far to enter the Cache near the middle of the natural area. If the rain is general over southern Illinois, Limekiln Slough and Kitchell Slough are carrying water into the natural area section of the Cache. The headwaters of Limekiln Slough have been extensively cleared and ditched in the Brushy Pond area, so that its runoff is also reaching the Cache in much shorter periods of time than it used to. While the tributary watersheds are dumping their loads directly into the lower Cache, upper Cache water is meeting all the runoff from the Massac County part of the Basin (Big Black Slough region) at a point just northeast of Karnak. This water is nearly all carried into the Ohio River by the Post Creek Cutoff, but when the Ohio is high and the Cutoff is full, it can keep the lower Cache water from flowing back into the Cutoff for days at a time. Thus, the only outlet to drain the natural area for extended periods, is downstream along the old channel of the Cache. This part of the river is relatively small, crooked, and choked with drifts, so that it can't begin to carry all the water away as quickly as it enters the Basin, especially when it has the waters of Mill Creek, Sandy Creek, Boar Creek, and Lake Creek to handle as well. With no way for it to flow downstream as it should, Big Creek water runs backwards (to the east) into the natural area. Here, it meets Cypress Creek water, and the currents of both are slowed while the water spreads over the swamps and floodplain. Depending on the Ohio and Mississippi river levels and also upon the varying amounts of rainfall that may have occurred in different parts of the watershed, the water

in the natural area section of the Cache River may flow either direction (east or west), and it may divide at different points. As the water levels begin to fall, Big Creek water primarily goes back to the west to flow on downstream as it should. Most of Cypress Creek water drains backwards to the east into the Post Creek Cutoff. Other factors also influence the direction of flow and division of water at given points. If the swamps and ponds in the Long Reach area are already full of water when a rain begins, less of Big Creek water can flow back into the area. If Long Reach is nearly dry, Big Creek flows east, and Cypress Creek flows west until the low depression is filled. As the water levels drop, the accumulations of silt which form bars at the mouths of the tributaries may also deflect the water one direction or the other. These bars sometimes act as dams to hold some water in the area. In recent years, beaver dams, especially at the mouth of Cypress Creek, have helped to divert the flow one direction or the other. The silt bars and beaver dams are not permanent features and are continually changed by floods.

Spring water flows into the natural area along the south side of the river near the mouth of Limekiln Slough. It is not known just how much water the visible springs contribute. Perhaps more flow is seeping into the swamps below normal water level than from those springs that are visible, and together the amount is substantial. Spring water is especially significant during times of drought, such as during the summers of 1980 and 1983.

During the fall of 1982, a local preservation group, the Citizens Committee To Save The Cache, constructed a low dam across the Cache River in section 15, just west of the Perks Bridge. The Illinois Chapter of The Nature Conservancy provided the funding for the project. The purpose of the dam was twofold: 1) to hold a higher base level of water in the Long Reach swamps area, and 2) to keep out as much of the silty backwater from Big Creek as possible. According to prior observations, silt was accumulating in the lowest depressions in the Long Reach area at the rate of nearly 12 inches per year for each of the six years after the last channel dredging. This channel work had removed the old natural dam across the Cache east of the mouth of Big Creek, and the Long Reach swamps had begun to annually drain and practically dry up during the summer and fall seasons. Thus, when heavy rains came, and the silt laden waters of Big Creek and Cypress Creek (and Limekiln Slough to a lesser extent) rushed down to the Cache, they filled the swamps before moving either east towards the Post Creek Cutoff or west down lower Cache to leave the area. When the currents of Big Creek and Cypress Creek met, and the waters stopped,

Figure 13. A spring flowing from limestone into Limekiln Slough: springs in this vicinity provide an important source of water for the swamps during dry periods

Figure 14. Limestone outcropping along Limekiln Slough south of Cache River: this is one of the few places bedrock is visible in the Basin

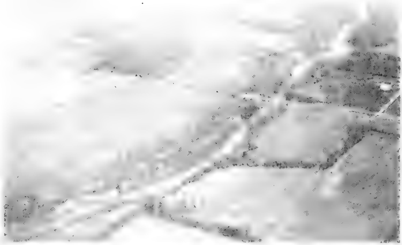

Figure 15. Aerial view of Post Creek Cutoff, Ohio River is in upper right; note bank erosion

Figure 16. A typical view of the "scatters" north of the river near the Perks bridge: the trees are mostly tupelo; the shrubby layer is buttonbush

for several hours or even days, the silt dropped out in the swamps and river channel. As the Long Reach and Short Reach areas began to fill with silt, willows began to grow in the shallows, especially in the channel bed just east of the Perks Bridge. Buttonbush began to spread into the open ponds and became more dense throughout the swamps. Now, the water in the natural area is much shallower, although its level has not dropped. Because of the lessened water holding capacity of the swamps, and increased flows into the Basin, flood levels are higher now than they naturally were prior to the drainage activities.

During the early 1940's, a lot of hardwood timber died in the natural area swamps along Long Reach. Large old bottomland oaks that were growing on the low ridges and on sites slightly better drained than the swamps apparently died of a common cause. Although all of the factors contributing to the timber kill are not known, it probably was the result of an unnatural drainage change. Big Creek had deposited a silt bar across the Cache just east of its (Big Creek's) mouth. This acted as a dam to hold the low water level higher back up in the Long Reach area. This permanent flooding of the sites that had naturally dried for several months of the year probably killed the oaks. At the same time, silt was also building up in the swamps to help push water levels even higher. When the silt dam was dredged, the swamps went dry faster and more often, and Big Creek water could then run backwards into the natural area more easily. Water level fluctuations became more drastic, and conditions were unfavorable for tree reproduction.

At the present time, there is good evidence that the artificial dam constructed by the Citizens Committee is helping to slow down sedimentation. Measurements of silt accumulations indicate 2 to 3 inches per year instead of 12 inches per year. When the water was high in the fall of 1984, the main channel of the Cache was extremely muddy, but the water in the sloughs and swamps back away from the river was nearly clear. This was obviously because the dam had held enough water in the swamps to keep the silty Cypress Creek and Big Creek water that did get into the area, mainly in the Cache River channel.

Climate and Soils

Southern Illinois has a humid continental climate. The average annual temperature is 58^{o} F, and the growing season varies from 193 to 222 days. Temperatures usually rise above 100^{o} F and fall below 0^{o} F for brief periods each year. The average annual precipitation is 48 inches including between 6 and 12 inches of

snowfall. Severe storms and drastic weather changes are frequent, and rains of 4 to 5 inches are not unusual. The times of greatest flooding usually occur during January, March, April, and May. September and October are the driest months. Average runoff in the Cache watershed is about one-third of the total precipitation (Brigham, 1978; U.S. Army Engineer District, St. Louis, 1984).

The soils on the uplands of the Cache watershed are mainly derived from loess. They have a fragipan, are relatively thin on slopes, and are subject to severe erosion when disturbed. Hosmer, Stoy, Zanesville, Lax, and Alford are typical soils of the hills both north and south of the Basin. Along the upper reaches of the Cache River, Cypress Creek, and Big Creek, the primary bottomland soils are Wakeland and Haymond. Downstream along the upper Cache, the swamp soils are mapped as Sharon and Belknap. The terrace soils along the lower Cache in the Basin are Weinbach, Ginat, and Sciotoville. The swamp and poorly drained soils along the lower Cache are Karnak, Dupo, Belknap, Bonnie, Cape, and Darwin. The natural area soils are mapped as the Karnak-Darwin association. These are light colored and moderately dark colored, fine-textured, poorly drained, slightly acid and medium acid soils. The bottomland soils formed in sediments left from the Ohio River floodplain and in recent alluvium derived from loess washed down into the Basin. Most of the silty soils, both on the uplands and in the bottomlands, are extremely soluble in water and settle out very slowly (Parks, 1975; Parks, 1979; Parks and Fehrenbacher, 1969).

Natural Communities

The Cache River watershed includes parts of three major physiographic regions, and it has a great diversity of plant and animal species. The uplands north of the Basin have dry-mesic forests with a variety of oaks and hickories. There are small but distinct limestone glades on south-facing slopes, and dry sandstone glades occur on ledges of massive bedrock. Narrow bottomlands along the streams occasionally widen and have small swamps of cypress and tupelo. Mesic forests with beech, sugar maple, and tuliptree occur in ravines. Dry ridge tops have dry to xeric forests with post oak, blackjack oak, and farkleberry. White oak and shagbark hickory are common and widespread trees.

South of the Basin, the low rounded gravel hills are commonly dry with post oaks and blackjack oaks dominant. Here, there are a few remnants of the original open grassy barrens that once covered much of the region. Little bluestem and Indian grass are typical barrens species.

On the Ozark Hills, the forests are generally more mesic with beech, sugar maple, and cucumber common. Chestnut oaks occur on the drier ridges north of Tamms, and the yellowwood tree occurs along Wolf Creek north of Olive Branch.

On the low sandy ridges and on terraces in the Cache Basin, there are a few remnants of the original forests left. Here, the finest timber in the watershed grew. In the forests that remain, sweetgum, cherrybark oak, tuliptree, and kingnut hickory are dominants. The original stands had a lot of elm.

In the swamps, cypress and tupelo are characteristic and usually dominant. Many of these trees are huge and old. Individuals have probably stood there for more than a thousand years. Swamp red maple, swamp cottonwood, water locust, and pumpkin ash are also common. Buttonbush and water elm are common shrubs.

The areas of open water, the ponds, usually are bordered by buttonbush and scattered large cypress trees.

The river has been disturbed by channel work in most places, but its natural stretches have large cypresses and dense thickets of water elm and buttonbush along its banks. Cottonwoods and willows commonly grow on the levees. Large grapevines hang from the upper limbs of the trees.

Most of the animals typical of the region occur within the Cache watershed, including a few uncommon species. A variety of fishes, amphibians, and reptiles occur in the swamps. Many are southern species, such as the bird-voiced treefrog, the green treefrog, and the cottonmouth. A southeastern amphibian, the dusky salamander, also occurs in the watershed. Common birds are the chimney swifts, which roost in the hollow cypresses, and the yellow prothonotary warbler. Ospreys and bald eagles are occasionally seen in the winter. Barn owls were recently found nesting in a hollow cypress in the natural area. A few swamp rabbits are left in the bottomlands along the lower Cache and the Little Black Slough area.

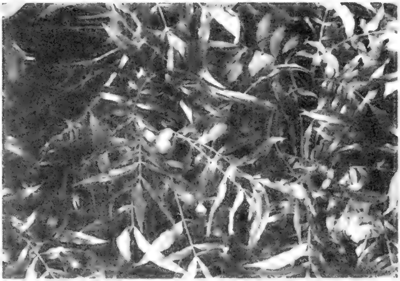

Figure 17. The water hickory, Carya aquatica; this is a southern tree that reaches the northern limit of its range in this area

Figure 18. An aerial view of the silt accumulating in the Ohio River at the mouth of the Post Creek Cutoff

Degradational and Detrimental Activities

Soil Erosion and Degradation

A basic problem in protecting wetlands is that they are extremely susceptible to detrimental activities anywhere in the watershed. One of the more common and widespread of such disturbing activities throughout the country is soil erosion. In the Cache River Watershed, erosion of the soils by running water, both on the uplands and in the floodplains, has caused, and is causing, serious problems in the natural area and throughout the Basin.

The hilly upland is where most of the serious agricultural erosion occurs--where the soils in crop fields are left exposed to rainstorms, where stream banks have been cleared of vegetation or trampled by livestock, where heavy machinery leaves ruts, and where ditches and gullies form easily and concentrate runoff. These are estimates of annual soil losses in the headwaters of Big Creek and Cypress Creek exceeding 70 tons per acre. The majority of soil loss occurs during short periods of time, usually during the severest rainstorms in the late fall or early spring seasons. These dramatic losses are not always so obvious, because sheet erosion is spread out over large areas. When a layer of soil only 1/8 inch thick erodes away, the land has lost 20 tons of soil per acre. In 1979, the Soil Conservation Service reported the average soil loss of cropland in Pulaski County was 19.2 tons per acre each year (Stewart, 1979). Not only is a large amount of soil lost by erosion, but it's the best soil, the topsoil that washes away.

Another erosion activity is also occurring along the Cache that is related, but not directly a result of farming activities. This is streambank erosion. Both on the hills and in the bottoms, concentrated flows and fluctuating water levels are causing severe landslides and slumps along the steep banks of Big Creek, Cypress Creek, and the Cache River itself. The basic cause of this type of erosion is the change in longitudinal gradient. As stream courses have been shortened (by channelization, diversions, and cutoffs), their gradients have been steepened. This upsets the natural equilibrium in the watershed and causes the streams to scour their channels deeper, beginning at their mouths and moving upstream. As a channel deepens, the cross-sectional channel gradient is steepened, upsetting the bank stability. The natural armor plate that has developed over many years to stabilize the banks under normal conditions is

destroyed by undercutting.

Erosion is a natural activity. Basically it's the action of weathering agents trying to level uneven topography. Under natural conditions, the erosion activity was relatively slow in the Cache River area. The force of rain falling was checked by a dense forest canopy. Runoff was slowed by a thick layer of leaf litter. Stream flow was checked and dispersed by logs, litter, and debris that formed drifts and dams. Shallow streams overflowed frequently but slowly along low level banks, and there were wide floodplains to hold the water until it could be slowly released to reenter the stream. The land surface, even on slopes and along stream banks, slowly hardened and developed an armor-like cover. This armor plate protected the soil from being loosened and eroded under normal weathering and flooding conditions. There were occasional severe storms and long wet periods when local sites would erode, but the process was never widespread enough to upset the equilibrium that had developed, and these sites had time to heal and become re-vegetated. Since settlement, unnatural changes in several parts of the process have disturbed the entire systems equilibrium, and it will take a hundred years or more for a stream the size of the Cache River to adjust to a new set of conditions.

Sedimentation

The product of upstream erosion in the watershed is sedimentation in the natural area wetlands. The soil that's washed from the agricultural hill land and that is eroded from the ever widening stream banks is dumped directly into the Cache River channel by means of diversion ditches and straightened channels along Big Creek and Cypress Creek. Their waters are nearly always muddy. Here in the natural area, the currents are slowed because there's no outlet to remove the water as quickly as it can enter. As the water slows and virtually stops, much of the silt settles out. This part of the Cache never has enough current to remove the silt accumulation from the area, although a certain amount of it is re-dissolved and moved around during times of flooding. The ponds and swamps are filling rapidly, and even the Cache channel silted full in six years after being dredged six feet deep. This sedimentation has encouraged the establishment of willows in the channel and the spread of buttonbush in the swamp openings. It is probably partly responsible for the death of old oak trees that once grew along the swamp edges.

Pollution

Associated with the sediment load that is periodically dumped into the natural area, certain other pollutants are also a threat to

the integrity of the natural area. Runoff from agricultural land does carry fertilizers (nitrogen and phosphorus), chemical weed killers, and insecticides into the swamps. It is not known what detrimental effects these are having upon the vegetation and overall water quality, but such may become even more serious in the future.

Flooding

Flooding has always been a common occurence of primary concern to local residents in the Cache River Basin. The area naturally had poor drainage, and many hundreds of thousands of dollars have been spent over the years in efforts to drain it. During exceptionally dry years, more swamp land is invariably cleared by farmers still hoping to increase their crop land acreage. The more wet land that is cleared and put into production, the greater the flooding problems appear to be. The simple truth is that until the climate changes, the Basin will always have the same amount of water to handle as it did in presettlement times. Now that the streams have been channelized and leveed, and there are no longer huge natural swamps to hold the flood water, it either has to be transported quickly to the Mississippi and Ohio rivers, or it has to spread out over farmland. It is not as simple as it may seem to get rid of the water by simply digging straight ditches, such as the Post Creek Cutoff. In trying to solve one problem, others are created. As the water is carried at greater velocities, erosion, especially bank erosion, is accelerated. This erosion tends to affect the entire watershed, all the way upstream to the head of every tributary. The ditches must carry tremendous amounts of silt which settles in the ditches where the grades are gentle. The silt must be continually dredged to keep the ditches open. When the currents are great enough to keep the ditches free of silt, the banks erode drastically. The ground water levels are lowered, and droughts are more severe. Thus, some landowners may appear to benefit by draining swampland, but others lose land due to sedimentation and erosion. And all landowners in the drainage districts help pay for the construction and maintenance activities in the form of drainage taxes.

Loss of Water in Natural Wetlands

A serious problem in maintaining the natural swamps is keeping water in them. Almost every land use "improvement" in the area since settlement has been designed to drain the wetlands. Dredging, ditching, and the removal of drifts probably have not reduced flood levels much, but they have (with the help of sedimentation filling the depressions) caused the swamps to dry up during periods of

little rainfall.

Swamps need water to keep them swamps and to distinguish them from wet floodplain woods. Swamps and ponds that naturally were flooded 6 to 8 months of the year rapidly change when drained. Young trees and shrubs of several species move in and become established. Weeds and vines frequently thrive, including exotics if there are seed sources in the vicinity. Native plants that are adapted to a water environment die or are crowded out. Fish die, and many amphibians and reptiles have to leave or are subject to extreme predation. Larger animals also suffer. The last native flocks of wild turkeys in Illinois survived until 1920 in the Cache River swamps. They could fly to the low ridges when flushed and be well protected from man and predators by the sloughs. After the swamps were drained, they quickly disappeared.

The lack of sufficient water in the natural area ponds and swamps has caused some rather extensive fish kills particularly during the early 1980's. Shrubby vegetation is filling in a lot of swamp areas that used to be open water. Some exotic species have become established. The low dam constructed by the Citizen's Committee To Save The Cache in 1982 has helped to maintain a higher low water level in the Long Reach area than was previously the case.

Declining Populations of Plants and Animals

Most plants that originally occurred in the natural area are probably still represented, but certain ones are reduced in numbers. Selective logging has removed many of the large overcup oaks that used to be so common on the low ridges in the area. The willow oak, a rare tree in Illinois, was probably fairly common prior to land clearing activities, but now, there are only a few individuals left along Limekiln Slough. Throughout the Basin, the cypress and tupelo stands have been greatly reduced in numbers and size, and few old trees are left outside of the natural area. The pecan originally occurred in Brushy Pond along the headwaters of Limekiln Slough, but now there are few native trees left.

Animals have suffered to a greater extent. The larger mammals that originally occurred in the Basin and watershed area, such as the buffalo, elk, cougar, black bear, and wolf, are now gone. There are still a few bobcats and otters that occasionally move through the area, but they are rare. The swamp rabbit occurs but is scarce. The passenger pigeon, ivory billed woodpecker, and Carolina parakeet are totally extinct. The American egret was once common but now probably does not occur in the watershed. Bats are apparently less

common now throughout the area than they were 100 years ago when certain species commonly frequented the large hollow cypress trees.

Loss of Natural Vegetation and Wildlife Habitat

The primary reason for the destruction of the forests and wildlife habitat has been land clearing for agricultural purposes. The best land in the watershed was cleared early, but marginal land on rocky slopes and in wet swamps is still being bulldozed to make more cropland. During the exceptionally dry years of the 1960's and 1970's, hundreds of acres of swampland were cleared along the Cache River between Karnak and Ullin. Much of this land is still too wet to farm, but landowners continue to try, sometimes getting soybeans planted, but seldom being able to harvest them.

Land clearing essentially eliminates native vegetation from a site and changes its value for wildlife. Certain species of birds are attracted to open cropland and to cleared land that is seasonally flooded, but the native forest species are essentially gone.

In the natural area, a tract of nearly 200 acres was cleared in the 1970's. It was replanted in trees, but flooding has killed many of the young saplings. About the same time, a tract of about 120 acres was cleared by a farmer in section 16, at the west end of the natural area. It has mostly been too wet to cultivate, and a lot of it is growing up in weeds and brush. Around 1980, about 80 acres were cleared in sections 7, 8, and 18, just south of White Hill. This property is now owned by the State and is being allowed to revert to forest.

Exotic Species

Exotics are common throughout most of the Basin and non-native plants and weedy species have been introduced into parts of natural area by land clearing, agricultural activities, and the drying of the swamps. Japanese honeysuckle occurs in several places along the swamp edges. Some common weeds occur near the hunting cabins. Considering the natural area as a whole, exotics are not yet serious and present no real threat to its natural integrity at this time.

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ERIGENIA

Number 9 September, 1987

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Cover Photo: Murphysboro Marsh in winter.

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Murphysboro Marsh

Robert H. Mohlenbrock

A little known one-acre wetland habitat about one mile north of Murphysboro in Jackson County has long been known as a unique natural area since its discovery by Raymond Hatcher and the author during the summer of 1948 while we were still in high school. For want of a better name, we called it the Murphysboro Marsh, and that name is applied today to it by the few people who know of its existence.

The area is nearly circular and treeless in the center where the water is deepest. Surrounding the marsh is a dense woodland border of green ash (*Fraxinus lanceolata*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), slippery elm (*Ulmus rubra*), swamp chestnut oak (*Quercus michauxii*), and black willow (*Salix nigra*).

The marsh itself is not visible from the country road that passes within 50 feet of it, but a roadside ditch full of aquatic plants and a dense hedge of swamp rose (*Rosa palustris*) mark the area from the road.

Plants in the wet ditch include arrowhead (*Sagittaria latifolia*), water plantain (*Alisma plantago-aquatica* var. *parviflorum*), wild blue iris (*Iris shrevei*), small buttercup (*Ranunculus pusillus*), parsley buttercup (*Ranunculus sceleratus*), manna grass (*Glyceria striata*), perfoliate boneset (*Eupatorium perfoliatum*), ground bean (*Apios americana*), and several sedges (*Scirpus cyperinus*, *Carex lurida*, *C. vulpinoidea*, *C. tribuloides*, *C. squarrosa*, *C. frankii*, and *C. shortiana*).

But it is the marsh itself that is the center of attraction. The area is bog-like, and it is unwise and usually impossible to walk into the depth of the marsh without

sinking in to one's knees. Voigt and Mohlenbrock (1964) described the area as "a seepage area" in which "a small spring flows onto low ground where drainage is poor, and this results in a marshy condition throughout the year. . From the immediate area of the orifice may be found water starwort (Callitriche heterophylla), while along the course of its flow to lower ground is a dense stand of tear thumb (Polygonum sagittatum)."

The deepest area is dominated by marsh goldenrod (Solidago patula) and marsh fern (Thelypteris palustris var. pubescens), two species generally not found elsewhere in extreme southern Illinois. Dominant sedges are Carex crus-corvi, C. crinita, C. stipata, C. comosa, and C. lanuginosa.

In the wooded border, smooth arrowwood (Viburnum recognitum) is common, and the hairy buttonbush (Cephalanthus occidentalis var. pubescens) is present. Growing in the transition zone between the marsh and its drier border are swan's sedge (Carex swanii), false nettle (Boehmeria cylindrica var. drummondiana), and white turtlehead (Chelone glabra).

This small area is privately owned, but efforts should be made to acquire it for an Illinois Nature Preserve so that this unusual habitat in southern Illinois can be preserved.

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Taxa New to Illinois in Guide to The Vascular Flora of Illinois, Revised and Enlarged Edition

Robert H. Mohlenbrock

One hundred eighty taxa of vascular plants are included in the Guide to the Vascular Flora of Illinois, Revised and Enlarged Edition (1986) that were not in the previous edition (1975). These additions during the decade represent newly discovered taxa in Illinois or, in a few instances, taxa which are now recognized as distinct but were not considered distinct in 1975.

An analysis of these 180 additions provides some interesting data. Nine of the additions, including four hybrids, are ferns. All are considered native in Illinois. Four species are gymnosperms, all introduced. Of the thirteen additional grasses, only five are native. In addition to the grasses and ferns, there are 80 new adventive herbs and 42 new native herbs. Among the broad-leaved woody plant additions, 25 are adventive and 7 are native.

In summary, there are 32 additional woody taxa and 148 additional herbaceous taxa. One hundred seventeen of the additions are adventive, 63 are native.

A number of taxa included in the 1975 work have been reduced to synonymy and no longer are recognized.

The overall total number of taxa in the Guide to the Vascular Flora of Illinois, Revised and Enlarged Edition (1986) is 3,203.

The following list contains the 180 taxa of vascular plants added to the Illinois flora between 1975 and 1986. The sequence follows that found in the new edition.

Selaginella eclipes Buck SELAGINELLACEAE
Botrychium oneidense (Gilb.) House OPHIOGLOSSACEAE
Gymnocarpium robertianum (Hoffm.) Newm. ASPLENIACEAE
Dryopteris filix-mas (L.) Schott ASPLENIACEAE
Asplenium X shawneense (R.C. Moran) ASPLENIACEAE
Asplenium trichomanes L. ssp. quadrivalens D.E. Meyer ASPLENIACEAE
Cystopteris X illinoensis Moran ASPLENIACEAE
Cystopteris X laurentiana (Weatherby) Blasd. ASPLENIACEAE
Cystopteris X tenuis (Michx.) Desv. ASPLENIACEAE
Picea mariana (Mill.) BSP. PINACEAE
Picea abies (L.) Karst. PINACEAE
Pinus wallichiana A.B. Jacks. PINACEAE
Pinus nigra Arnold PINACEAE
Bromus carinatus Hook. POACEAE
Bromus squarrosus L. POACEAE
Calamagrostis neglecta (Ehrh.) Gaertn. POACEAE
Hordeum geniculatum All. POACEAE
Diarrhena americana Beauv. var. obovata Gl. POACEAE
Paspalum laeve Michx. var. circulare (Nash) Fern. POACEAE
Paspalum dilatatum Poir. POACEAE
Andropogon hallii Hack. POACEAE
Andropogon ternarius Michx. POACEAE
Sporobolus ozarkanus Fern. POACEAE
Leptochloa uninervia (Presl) Hitchc. & Chase POACEAE
Zoysia japonica Steud. POACEAE
Pennisetum alopecuroides (L.) Spreng. POACEAE
Cyperus retrorsus Chapm. CYPERACEAE
Eleocharis parvula (Roem. & Schult.) Link CYPERACEAE
Scirpus mucronatus L. CYPERACEAE
Scleria oligantha Michx. CYPERACEAE
Calla palustris L. ARACEAE
Tradescantia subaspera Ker var. montana (Shuttlew.) Anders. & Woodson COMMELINACEAE
Liriope spicata Lour. LILIACEAE
Allium fistulosum L. LILIACEAE
Erythronium mesochoreum Knerr LILIACEAE
Ornithogalum natans L. LILIACEAE
Lycoris radiata Herb. LILIACEAE
Dioscorea batatas Dcne. DIOSCOREACEAE
Iris flavescens DC. IRIDACEAE
Thalia dealbata Roscoe MARANTACEAE
Spiranthes romanzoffiana Cham. ORCHIDACEAE
Isotria medeoloides (Willd.) Raf. ORCHIDACEAE
Betula pumila L. var. glabra Regel BETULACEAE

Betula pumila L. var. glandulifera Regel BETULACEAE
Corylus rostrata Ait. CORYLACEAE
Castanea mollissima Blume FAGACEAE
Rumex longifolius DC. POLYGONACEAE
Rumex cristatus DC. POLYGONACEAE
Polygonum arenastrum Boreau POLYGONACEAE
Polygonum neglectum Besser POLYGONACEAE
Salsola collina Pallas CHENOPODIACEAE
Corispermum nitidum Kit. CHENOPODIACEAE
Atriplex glabriuscula Edmondston CHENOPODIACEAE
Chenopodium pumilio R. Br. CHENOPODIACEAE
Monolepis nuttalliana (R. & S.) Greene CHENOPODIACEAE
Mirabilis jalapa L. NYCTAGINACEAE
Cerastium semidecandrum L. CARYOPHYLLACEAE
Ranunculus arvensis L. RANUNCULACEAE
Ranunculus ficaria L. RANUNCULACEAE
Eranthis hyemalis (L.) Salisb. RANUNCULACEAE
Consolida regalis S.F. Gray RANUNCULACEAE
Delphinium carolinianum Walt. var. penardii (Huth) Warnock RANUNCULACEAE
Cimicifuga americana Michx. RANUNCULACEAE
Aconitum uncinatum L. RANUNCULACEAE
Calycanthus floridus L. CALYCANTHACEAE
Dicentra eximia (Ker) Torr. PAPAVERACEAE
Tamarix gallica L. TAMARICACEAE
Cardamine pratensis L. var. palustris Wimm. & Grab. BRASSICACEAE
Thlaspi perfoliatum L. BRASSICACEAE
Matthiola incana (L.) R.Br. BRASSICACEAE
Lunaria annua L. BRASSICACEAE
Sedum rupestre L. CRASSULACEAE
Sedum alboroseum Boreau CRASSULACEAE
Rhodotypos scandens (Thunb.) Makino ROSACEAE
Kerria japonica L. ROSACEAE
Spiraea japonica L. ROSACEAE
Prunus triloba Lindl. ROSACEAE
Prunus padus L. ROSACEAE
Amelanchier sanguinea (Pursh) DC. ROSACEAE
Pyrus calleryana Dcne. ROSACEAE
Rosa wichuriana Crep. ROSACEAE
Rosa moschata Herrm. ROSACEAE
Rosa rubrifolia Vill. ROSACEAE
Rosa acicularis Lindl. ROSACEAE
Potentilla reptans L. ROSACEAE
Potentilla inclinata Vill. ROSACEAE

Fragaria vesca L. ROSACEAE
Filipendula ulmaria (L.) Maxim. ROSACEAE
Porteranthus trifoliatus (L.) Britt. ROSACEAE
Psoralea argophylla Pursh FABACEAE
Lathyrus hirsutus L. FABACEAE
Medicago falcata L. FABACEAE
Canavalia ensiformis (L.) DC. FABACEAE
Lespedeza X manniana Mack. & Bush FABACEAE
Lespedeza daurica (Laxm.) Schindl. FABACEAE
Lespedeza bicolor Turcz. FABACEAE
Oxalis illinoensis Schwegm. OXALIDACEAE
Geranium sanguineum L. GERANIACEAE
Ruta graveolens L. RUTACEAE
Phyllanthus urinaria L. EUPHORBIACEAE
Croton lindheimerianus Scheele EUPHORBIACEAE
Euphorbia hexagona Nutt. EUPHORBIACEAE
Euphorbia lathyrus L. 1 EUPHORBIACEAE
Chamaesyce prostrata (Ait.) Small EUPHORBIACEAE
Toxicodendron toxicarium (Salisb.) Gillis ANACARDIACEAE
Nemopanthus mucronatus (L.) Trelease AQUIFOLIACEAE
Euonymus kiautschovica Loes. CELASTRACEAE
Acer rubrum L. var. trilobum Koch ACERACEAE
Rhamnus davurica Pall. RHAMNACEAE
Viola tricolor L. VIOLACEAE
Opuntia fragilis (Nutt.) Haw. CACTACEAE
Thymelaea passerina (L.) Coss. & Germ. THYMELAEACEAE
Elaeagnus multiflora Thunb. ELAEAGNACEAE
Oenothera triloba Nutt. ONAGRACEAE
Aralia elata Seem. ARALIACEAE
Hydrocotyle ranunculoides L.f. APIACEAE
Spermolepis echinata (Nutt.) Heller APIACEAE
Anthriscus cerefolium (L.) Hoffm. APIACEAE
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Lysimachia fraseri Duby PRIMULACEAE
Ligustrum obtusifolium Sieb. & Zucc. OLEACEAE
Gentiana septemfida Pall. GENTIANACEAE
Gentiana clausa Raf. GENTIANACEAE
Asclepias speciosa Torr. ASCLEPIADACEAE
Convolvulus incanus Vahl CONVOLVULACEAE
Calystegia sepium (L.) R.Br. ssp. angulata Brummitt CONVOLVULACEAE
Calystegia sepium (L.) R.Br. ssp. erratica Brummitt CONVOLVULACEAE
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<u>Phlox maculata</u> L. ssp. <u>pyramidalis</u> (J.E. Smith) Wherry POLEMONIACEAE
<u>Phlox carolina</u> L. ssp. <u>angusta</u> Wherry POLEMONIACEAE
<u>Phacelia gilioides</u> A. Brand HYDROPHYLLACEAE
<u>Asperugo procumbens</u> L. BORAGINACEAE
<u>Lycopus europaeus</u> L. LAMIACEAE
<u>Ballota nigra</u> L. LAMIACEAE
<u>Perilla frutescens</u> (L.) Britt. var. <u>crispa</u> (Benth.) Deane LAMIACEAE
<u>Solanum heterodoxum</u> Dunal var. <u>novomexicanum</u> Bartl. SOLANACEAE
<u>Physalis texana</u> Rydb. SOLANACEAE
<u>Nicotiana longiflora</u> Cav. SOLANACEAE
<u>Veronica agrestis</u> L. SCROPHULARIACEAE
<u>Penstemon brevisepalus</u> Pennell SCROPHULARIACEAE
<u>Penstemon canescens</u> Britt. SCROPHULARIACEAE
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<u>Lonicera</u> X <u>minutiflora</u> Zabel CAPRIFOLIACEAE
<u>Lonicera</u> X <u>muscaviensis</u> Rehd. CAPRIFOLIACEAE
<u>Valeriana sitchensis</u> Bong. ssp. <u>uliginosa</u> (Torr. & Gray) F.G. Mey. VALERIANACEAE
<u>Valeriana chenopodifolia</u> (Pursh) DC. VALERIANACEAE
<u>Knautia arvensis</u> (L.) Coult. DIPSACACEAE
<u>Campanula glomerata</u> L. CAMPANULACEAE
<u>Senecio jacobaea</u> L. ASTERACEAE
<u>Solidago boottii</u> Hook. ASTERACEAE
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Silphium speciosum Nutt. ASTERACEAE
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Lactuca hirsuta Muhl. var. sanguinea (Bigel.) Fern. ASTERACEAE

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New Distribution Data for Illinois Vascular Plants III

Robert H. Mohlenbrock

Continued field and herbarium research from 1984 to the present has resulted in several new vascular flora distributional additions for Illinois. This paper is an update of Mohlenbrock and Ladd (1978) and the first two supplements in this series (Mohlenbrock & Ladd, 1983; Mohlenbrock, 1985).

This paper is divided into two parts: a listing of additional distributional records for mapped taxa in Mohlenbrock & Ladd (1978), and a listing of taxa previously unmapped or unreported in the two preceding articles in this series. Some of the records listed below were previously reported by Hess, Podasky, & Stoynoff (1986).

Although the nomenclature for more than 300 taxa in the Illinois flora has changed between the publications of Mohlenbrock & Ladd (1978) and Mohlenbrock (1986), the nomenclature in this paper adheres to that in Mohlenbrock & Ladd (1978) to permit ease in updating the distributional records.

All records listed in this paper have been confirmed by the author, who has more complete data, including herbaria where the specimens are deposited, in his files.

Additional Distribution Records for Mapped Taxa

Acer rubrum var. *trilobum*: WILLIAMSON. *Allium sativum*: WILLIAMSON. *Alnus glutinosa*: HARDIN. *Alyssum alyssoides*: ROCK ISLAND. *Amaranthus ambigens*: DEKALB, DUPAGE, KENDALL, TAZEWELL. *Amaranthus cruentus*: PEORIA. *Amaranthus spinosus*: TAZEWELL. *Amphicarpa bracteata* var. *comosa*: WILLIAMSON. *Andropogon ternarius*: SALINE. *Arabidopsis thaliana*: WILLIAMSON. *Aralia spinosa*: WILLIAMSON.

Aristolochia serpentaria: KENDALL, WILLIAMSON. Arrhenatherum elatius: POPE, WILLIAMSON. Asclepias quadrifolia: WOODFORD. Asclepias sullivantii: WASHINGTON. Asclepias viridiflora: LAWRENCE. Aster novae-angliae: WILLIAMSON. Aster patens: WILLIAMSON. Aster shortii: WILLIAMSON. Athyrium filix-femina var. asplenioides: WILLIAMSON. Azolla mexicana: TAZEWELL.

Belamcanda chinensis: ROCK ISLAND. Berberis thunbergii: WILLIAMSON. Betula nigra; WHITESIDE. Bidens cernua: WILLIAMSON. Bouteloua curtipendula: CHAMPAIGN. Brachyelytrum erectum: WILLIAMSON. Brassica nigra; OGLE. Brassica rapa: WILLIAMSON. Bromus arvensis: WILLIAMSON. Bromus japonicus: WILLIAMSON.

Cacalia muhlenbergii: WILLIAMSON. Cardamine pensylvanica: FULTON, WHITESIDE. Cardaria draba: PEORIA. Carex albursina: WILLIAMSON. Carex caroliniana: MARION. Carex comosa: BUREAU. Carex convoluta: WILLIAMSON. Carex emoryi: WILLIAMSON. Carex festucacea: WILLIAMSON. Carex gravida: MARION. Carex haydenii: MASON. Carex hystricina: WILLIAMSON. Carex lupulina: WHITESIDE. Carex lurida: BUREAU. Carex meadii: UNION. Carex muskingumensis: WOODFORD. Carex normalis: WILLIAMSON. Carex pensylvanica: WILLIAMSON. Carex scoparia: WILLIAMSON. Carex tenera: WILLIAMSON. Carex tetanica: MASON. Carex texensis: WILLIAMSON. Carex torta: WILLIAMSON. Carex umbellata: WILLIAMSON. Carya laciniosa: WILLIAMSON. Carya texana: WILLIAMSON. Caulophyllum thalictroides: WILLIAMSON. Celtis tenuifolia var. georgiana: WILLIAMSON. Cerastium brachypodum: ROCK ISLAND. Cerastium pumilum: WILLIAMSON. Cerastium viscosum: COOK, MACOUPIN. Clitoria mariana: WILLIAMSON. Conium maculatum: MERCER. Corallorhiza odontorhiza: SHELBY. Corallorhiza wisteriana: WILLIAMSON. Corispermum hyssopifolium: CARROLL. Crataegus crus-galli: ROCK ISLAND. Crataegus monogyna: DUPAGE, PEORIA. Crataegus pruinosa: WILLIAMSON. Cyperus aristatus: LEE, WILLIAMSON. Cyperus filiculmis: PEORIA. Cyperus houghtonii: WHITESIDE.

Descurainia sophia: PEORIA. Desmodium nudiflorum: WILLIAMSON. Desmodium nuttallii: WILLIAMSON. Desmodium pauciflorum: WILLIAMSON. Diarrhena americana var. obovata: FAYETTE. Dipsacus sylvestris: UNION, WILLIAMSON. Draba

verna: MACOUPIN. Dyssodia papposa: LIVINGSTON.

Elodea canadensis: JACKSON, WILLIAMSON. Eleocharis elliptica: WILLIAMSON. Eragrostis frankii: TAZEWELL, WILLIAMSON. Euonymus atropurpureus: WILLIAMSON. Euonymus fortunei: MADISON, WILLIAMSON. Euphorbia commutata: WILLIAMSON.

Gerardia fasciculata: WILLIAMSON. Gerardia paupercula: WILLIAMSON. Goodyera pubescens: WILLIAMSON.

Hackelia virginiana: WILLIAMSON. Hosackia americana: DUPAGE. Houstonia longifolia: WILLIAMSON. Houstonia minima: ROCK ISLAND, WILLIAMSON. Hydrophyllum canadense: WILLIAMSON.

Ipomoea lacunosa: PUTNAM. Iris germanica: WILLIAMSON. Iva annua: WILLIAMSON.

Juncus secundus: WILLIAMSON. Juncus torreyi: WHITE.

Lactuca floridana: WILLIAMSON. Lamium amplexicaule: MACOUPIN. Lathyrus tuberosus: HENDERSON, KANE. Lechea tenuifolia: WILLIAMSON. Leersia virginica: WILLIAMSON. Lemna trisulca: FULTON. Lespedeza hirta: WILLIAMSON. Lespedeza stuevei: WILLIAMSON. Liatris cylindracea: LEE. Ligustrum vulgare: MARION. Lilium lancifolium: WHITE. Lilium superbum: WILLIAMSON. Linaria dalmatica: TAZEWELL. Lindernia anagallidea: LEE. Linum medium var. texanum: UNION. Linum striatum: UNION. Lobelia siphilitica: WILLIAMSON. Lonicera japonica var. chinensis: WILLIAMSON. Lonicera maackii: WILLIAMSON. Lonicera sempervirens: WILLIAMSON. Luzula multiflora: WILLIAMSON. Luzula multiflora var. echinata: WILLIAMSON. Lycopus virginicus: WILLIAMSON. Lysimachia ciliata: WILLIAMSON. Lysimachia lanceolata var. hybrida: DUPAGE, WILL.

Malus coronaria: WILLIAMSON. Malva sylvestris var. mauritiana: DUPAGE. Matricaria matricarioides: WILLIAMSON. Melica mutica: TAZEWELL. Monotropa hypopithys: PEORIA. Muhlenbergia bushii: LASALLE, WILLIAMSON. Muhlenbergia frondosa: WILLIAMSON. Muhlenbergia racemosa: TAZEWELL. Myosotis stricta: ROCK ISLAND.

Osmunda claytoniana: JACKSON. Oxypolis rigidior: ROCK ISLAND.

Panicum commutatum: WILLIAMSON. Panicum gattingeri: WILLIAMSON. Panicum lanuginosum var. implicatum: WILLIAMSON. Panicum linearifolium: WILLIAMSON. Papaver somniferum: JACKSON. Paspalum dissectum: WILLIAMSON. Penstemon calycosus: WILLIAMSON. Penstemon hirsutus: TAZEWELL. Phlox bifida: WILLIAMSON. Phlox pilosa: BUREAU. Pinus echinata: WILLIAMSON. Pinus strobus: DUPAGE. Pinus taeda: WILLIAMSON. Plantago major: WILLIAMSON. Poa angustifolia: WILLIAMSON. Poa annua: PEORIA. Poa sylvestris: WILLIAMSON. Polygonatum biflorum: WILLIAMSON. Polygonum cespitosum var. longisetum: UNION. Polygonum lapathifolium: WILLIAMSON. Polymnia canadensis: WILLIAMSON. Polymnia uvedalia: WILLIAMSON. Polytaenia nuttallii: PUTNAM. Populus tremuloides: WOODFORD. Potamogeton zosteriformis: PEORIA. Prunus americana: TAZEWELL. Prunus angustifolia: WILLIAMSON. Prunus mahaleb: TAZEWELL. Prunus munsoniana: WILLIAMSON. Prunus persica: WILLIAMSON. Ptelea trifoliata var. mollis: MASON, TAZEWELL.

Quercus coccinea: WILLIAMSON.

Ranunculus recurvatus: WILLIAMSON. Rhus aromatica: WILLIAMSON. Rhus aromatica var. arenaria: WILLIAMSON. Rorippa sylvestris: ALEXANDER, PUTNAM. Rubus allegheniensis: WILLIAMSON. Rubus alumnus: WILLIAMSON. Rubus enslenii: JOHNSON, WILLIAMSON. Rubus occidentalis: WILLIAMSON. Rubus occidualis: WILLIAMSON. Rudbeckia laciniata: WILLIAMSON. Rumex obtusifolius: WILLIAMSON.

Sagittaria rigida: KANE. Salix fragilis: WILLIAMSON. Salvia lyrata: WILLIAMSON. Sanicula canadensis: BUREAU. Scleria pauciflora: WILLIAMSON. Scutellaria lateriflora: WILLIAMSON. Scutellaria parvula var. leonardii: WILLIAMSON. Sedum pulchellum: WILLIAMSON. Senecio glabellus: FULTON. Smilax pulverulenta: WILLIAMSON. Solidago buckleyi: WILLIAMSON. Solidago graminifolia var. gymnospermoides: MASON. Solidago rigida: ROCK ISLAND. Sonchus arvensis var. glabrescens: PEORIA. Spiraea tomentosa: PEORIA. Spiranthes tuberosa: WILLIAMSON. Sporobolus asper: WILLIAMSON. Sporobolus clandestinus: HENDERSON.

Taraxacum laevigatum: WILLIAMSON. Thalictrum dasycarpum var. hypoglaucum: WILLIAMSON. Thaspium barbinode: BUREAU. Thelypteris palustris var. pubescens: ROCK ISLAND. Tilia americana: WILLIAMSON. Tragopogon dubius: TAZEWELL. Trifolium arvense: MASON. Trifolium dubium: WILLIAMSON. Triosteum illinoense: WILLIAMSON. Triosteum perfoliatum: WILLIAMSON.

Valeriana pauciflora: WILLIAMSON. Verbena simplex: WILLIAMSON. Verbena X illicita: WILLIAMSON. Veronica serpyllifolia: MASON, PEORIA. Vicia dasycarpa: WILLIAMSON. Viola pratincola: WILLIAMSON. Vulpia myuros: WILLIAMSON.

Wisteria macrostachya: FULTON. Wolffia columbiana: WILLIAMSON. Wolffiella floridana: WILLIAMSON.

Xanthoxylum americanum: WILLIAMSON.

Taxa Previously Unmapped or Unreported in this Series

Aconitum uncinatum L. DUPAGE.

Asplenium trichomanes L. ssp. quadrivalens D.E. Meyer. UNION.

Atriplex glabriuscula Edmondston. KANE.

Betula pumila L. var. glabra Regel. LAKE.

Betula pumila L. var. glandulifera Regel. LAKE, WINNEBAGO.

Botrychium oneidense (Gilb.) House. OGLE.

Carex willdenowii Schkuhr. GALLATIN.

Cerastium dubium L. EFFINGHAM.

Chenopodium pumilio R. Br. MCDONOUGH.

Corydalis curvisiliqua Engelm. var. grandibracteata Fedde. CASS.

Cystopteris X illinoensis Moran. WINNEBAGO.

Cystopteris X *laurentiana* (Weatherby) Blasd. OGLE.

Erythronium mesochoreum Knerr. MACOUPIN.

Fragaria vesca L. LAKE.

Gentiana clausa Raf. POPE.

Lespedeza bicolor Turcz. PERRY, WILLIAMSON.

Lespedeza X *manniana* Mack. & Bush. UNION.

Liatris squarrulosa Michx. ALEXANDER.

Lonicera japonica Thunb. var. *chinensis* (P.W. Wats.) Baker. POPE, WILLIAMSON.

Lonicera ruprechtiana Regel. DUPAGE.

Luffa cylindrica (L.) Roemer. JACKSON.

Minuartia groenlandica (Retz.) Ostenf. COOK.

Opuntia fragilis (Nutt.) Haw. JODAVIESS.

Penstemon brevisepalus Pennell. POPE, UNION.

Penstemon canescens Britt. FRANKLIN.

Penstemon gracilis Nutt. var. *wisconsinensis* (Pennell) Bennett. KANE.

Perilla frutescens (L.) Britt. var. *crispa* (Benth.) Deane. JACKSON.

Pinus virginiana Mill. WILLIAMSON.

Pinus wallichiana A.B. Jacks. UNION.

Porteranthus trifoliatus (L.) Britt. WABASH.

Ranunculus ficaria L. JACKSON.

Rosa moschata Herrm. PERRY.

Rudbeckia bicolor Nutt. JACKSON, UNION.

Silphium trifoliatum L. SALINE.

Solanum heterodoxum Dunal var. novomexicanum Bartl. CRAWFORD.

Solanum sarachoides Sendter. ST. CLAIR.

Solidago neurolepis Fern. JACKSON.

Zoysia japonica Steud. JACKSON.

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Narrow-leaved Vriginia Snakeroot, Aristolochia serpentaria var. hastata An Endanged Plant in Illinois

Robert H. Mohlenbrock

The narrow-leaved virginia snakeroot, Aristolochia serpentaria L. var. hastata (Nutt.) Duchartre, a plant of floodplain forests and cypress swamps, has been designated as endangered in Illinois (Natural Land Institute, 1981). Because of the taxonomic confusion that surrounds this taxon, it is necessary to discuss typical var. serpentaria, the virginia snakeroot, in any discussion of var. hastata.

Virginia snakeroot, Aristolochia serpentaria L. var. serpentaria, is a rather obscure herb that occurs in rich woods throughout most of Illinois except for the northwestern counties. The slender, usually zigzag stems, rarely exceeding 30 cm in height, grow from deep leaf litter on the forest floor. Because of its relative obscurity, it probably is more common than the distribution map indicates (Fig. 1).

The virginia snakeroot is also overlooked because its flowers and fruits are usually hidden by the leaf litter. The flowers, typically S-shaped and vaguely resembling a dutchman's pipe, are usually purple-brown, 3-lobed, and about 1.5 cm long. The capsule, which follows fertilization, at first is ellipsoid to nearly spherical, but splits open into a symmetrical 6-lobed, star-shaped structure, releasing the seeds which are 4-5 mm long. Underground is a small knotty rhizome from which grow yellowish roots that have a strong odor of turpentine. It is the substance in these roots that has long been known as a possible cure for a number of ailments, including snakebite, and from which the specific epithet and the common name are derived.

It is the leaves of the virginia snakeroot that permit easy identification, even in the absence of flowers and fruits. The leaves are broadly lanceolate to ovate-oblong, at least 2 cm broad at their widest point, and possess a pair of rounded lobes at the base (Figure 2). The range of this typical variety is from Connecticut southwest to southern Missouri, south to Texas, and east to Florida.

In a few rich bottomland forests and cypress swamps of extreme southern Illinois is the intriguing narrow-leaved virginia snakeroot, known here as Aristolochia serpentaria L. var. hastata (Nutt.) Duchartre. Although considered endangered in the state of Illinois and known only from Alexander, Johnson, Massac, Pulaski, and Union counties (Figure 1), this taxon is frequently observed along the Cache River between the villages of Karnak and Perks.

When seen in its most extreme narrow-leaved form, var. hastata has linear-lanceolate leaves sometimes no more than 5 mm broad at their widest point (Figure 3). Other specimens, however, may have leaves approaching or even slightly exceeding a width of 2 cm. As in the typical variety, this taxon has slender, zigzag stems and yellowish turpentine-scented roots. The flowers, fruits, and seeds are indistinguishable from those of var. serpentaria.

The narrow-leaved virginia snakeroot is a plant of the southeastern United States, occurring from Florida to Texas and up the Mississippi Embayment to southern Illinois and southern Missouri. In some of the southern areas, it is the more common of the two varieties of Aristolochia serpentaria.

When Thomas Nuttall first found the narrow-leaved plant, he described it as a distinct species, calling it Aristolochia hastata. Later, Thomas Kearney described the same entity as Aristolochia nashii. Botanists are generally in agreement that Nuttall's A. hastata and Kearney's A. nashii are one and the same. Duchartre was the first to suggest that since the only difference he could observe between the broad- and the narrow-leaved virginia snakeroots was the width of the leaves, they did not merit the status of two separate species. He accordingly named the narrow-leaved plants as a variety of Aristolochia serpentaria.

I must admit that when I first encountered the narrow-leaved plants in a southern Illinois cypress swamp, I had little doubt that they represented a good species since they looked so unlike the broader leaved plants. In addition, the swampy habitat was completely different from the rich hardwood forests that Aristolochia serpentaria grew in. Nonetheless, the flowers and fruits, usually considered by taxonomists to be the reliable structures on which to base distinct species, were virtually identical.

During the summer of 1986, David Ketzner, an Illinois Native Plant Society member and a graduate student in botany at Southern Illinois University, studied the vegetation along the Cache River between Karnak and Limekiln Slough just west of Perks. He was able to demonstrate a complete intergradation of leaf shape in var. hastata from leaves 5 mm broad to leaves at least 30 mm broad from plants growing in the bottomland forests adjacent to the river. No line could be drawn which would reliably separate the plants on the basis of leaf width.

It is obvious that unless additional characters come to light, the narrow-leaved virginia snakeroot should not be considered a separate species from Aristolochia serpentaria. There is some doubt that the narrow-leaved plants should have any nomenclatural designation, although the very distinct habitat lends some credence to its recognition as var. hastata.

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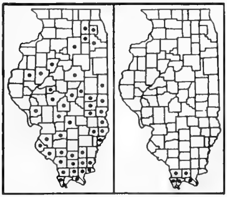

Aristolochia serpentaria

Aristolochia serpentaria var. hastata

An Overview of the Selective Advantage of Cleistogamy in the Poaceae

Sharon E. Bartholomew[1]

Abstract

The production of cleistogamous florets, i. e., those that remain closed at anthesis, is common in many grasses. This evolutionarily derived condition is expressed as a result of selective pressures working on a plastic genome. The degree of cleistogamy in grasses increases as a result of drought, heavy grazing, mowing, or burning. In addition, cleistogamy imparts a competitive advantage which allows these plants to be early colonizers of disturbed sites. Potentially detrimental effects due to selfing and the associated lack of population variability are neutralized by maintaining outcrossing through the production of both chasmogamous and cleistogamous inflorescences on the same plant.

Introduction

Numerous plant taxa have acquired a reproductive system which allows at least partial self-fertilization through the evolution of floral dimorphism. Of the two types of flowers, one, the chasmogamous flower, is adapted for cross-fertilization, while the other, the cleistogamous flower, is adapted for self-fertilization in that pollination and fertilization occur within closed florets (Clay 1982). This type of system reportedly exists in 287 species from 56 plant families and is especially prevalent in the grasses (Lord 1981; Clay 1982). Examples of grasses with dimorphic flowers include species of

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Amphicarpum Kunth, Andropogon L., Avena L., Bromus L., Chloris Swartz, Danthonia Lam. & DC., Festuca L., Leersia Swartz, Panicum L., Sorghum Moench, Sporobolus R. Br., Stipa L., Tridens Roem. & Schult., and Triplasis Beauv. (Lord 1981).

Although cleistogamous flowers appear to be distributed worldwide, cleistogamy is more frequent in grasses with a temperate climatic origin and are quite prevalent in America. Overall, the most evolutionarily advanced cleistogamous condition, in which specialized subterranean cleistogamous florets and aerial chasmogamous florets are produced as opposed to the simple intermixing of aerial chasmogamous and cleistogamous florets, occurs in members of the subfamily Pooideae (Rosenguitt 1984).

Observations of natural populations and controlled experimentation indicate that cleistogamy is an adaptation to adverse environmental conditions. It is a genetically plastic trait suseptible to modification by factors such as soil moisture, humidity, photoperiod, light intensity, plant density, and grazing, mowing or burning (Lord 1981, Clay 1982). Hence, through a genetic response to selective pressures, cleistogamous grasses are able to propagate under conditions which are unfavorable for the fertilization of chasmogamous flowers, ensuring their existance in addition to allowing cleistogamous species to be early colonizers of disturbed sites.

Morphology

In 1918, Chase described the axillary cleistogamous florets of some grasses as being so different from the chasmogamous ones, that if classification were based on the cleistogamous inflorescences, the plant would be placed in a totally different tribe from that indicated by the chasmogamous florets. In general, there is a reduction in floral structures as compared with chasmogamous flowers. The number of anthers, pollen sacs, and stamens is reduced as well as the length of the anthers and stigmas and the diameter of the pollen grains (Uphof 1938). In addition, the lodicules are reduced to such an extent that they are rendered nonfunctional. This condition, plus the fact that the cleistogamous florets are confined within vegetative sheaths

or by the soil in subterranean cleistogenes, accounts for the unopening of the flowers at anthesis (Chase 1918, Weatherwax 1928).

Disarticulation is usually at the nodes, so the caryopsis is permanantly enclosed in the sheath together with the internode and culm when dispersed (Chase 1918). Precocious germination ensues, often only after a period of dormancy which may be as long as one year (Dyksterhuis 1945). During this time, the basal portion of the ensheathing tissue begins to disintegrate allowing the entrance of water and silt, thus creating a suitable medium for germination. The primary root of the seedling extends through the partially disintegrated basal portion of the ensheathing tissue to anchor the young plant (Dyksterhuis 1945).

The positions of cleistogamous inflorescences are variable. Gould and Shaw (1985) site some cases as in Sporobolus cryptandrous (Torr.) A. Gray and Andropogon barbinodis Lag., where, under unfavorable climatic conditions, the normal spikelets of the terminal inflorescences are cleistogamous, remaining at least partially entrapped in the uppermost leaf sheaths. Many annuals, such as Sporobolus vaginiflorus (Torr.) Wood, develop lateral inflorescences late in the season, while the perennial Leptochloa dubia (H. B. K.) Nees produces short axillary inflorescences. In Stipa leuchotricha Trin. & Rupr., cleistogamous and chasmogamous spikelets are produced together in the terminal inflorescence and also at the base of the plant. Finally, in grasses such as Chloris chloridea (Presl.) Hitchc., Amphicarpum purshii Kunth., and A. muhlenbergianum (Schult.) Hitchc., the highly specialized cleistogamous spikelets terminate subterranean branches.

This variety of inflorescence positioning is reflected nicely in the classification scheme contrived by Lord (1981) for all cleistogamous plants. His groupings are a modification of Hackel's 1906 scheme. According to Lord (1981), preanthesis cleistogamy encompasses all cases in which bud pollination occurs followed by anthesis. This is common in cultivated legumes, grasses and other crop plants. In pseudocleistogamy, no morphological differences occur between cleistogamous and chasmogamous flowers other than their closed state at anthesis. This phenomenon is often induced by an environmental factor such

as drought. Complete cleistogamy occurs in species which produce only cleistogamous flowers. This is seen in some orchids and grasses. Finally, in "true" cleistogamy, floral dimorphisms result from divergent developmental pathways in a species or individual. The cleistogamous flowers are modified forms of the chasmogamous flowers differing primarily in the reduction of sexual parts. These dimorphic flowers typically occur on specific parts of the inflorescence in two different combinations. The chasmogamous florets may be on the aerial part of the spike, while the cleistogamous flowers are lateral or near the base of the plant and enclosed by leaf sheaths as in Panicum clandestinum L., or cleistogenes may terminate subterranean rhizomes as in Amphicarpum purshii.

The concomitant production of both cleistogamous and chasmogamous florets allows the species to retain the ability to outcross because the reproductive output of any individual consists of a mixture of self-fertilizing and cross-fertilizing progeny. This is an important factor since self-fertilization represents an extreme form of inbreeding. Theoretically, under this condition, the gene for cleistogamy could become fixed in a population (Bell & Quinn 1985). This increases homozygosity, decreases gene flow and decreases variability within a population, which, under changing environmental conditions, could become deleterious by hindering the evolutionary potential of the population (Clay 1982).

Responses to Selective Pressures

The involvement of cleistogamy in the reproductive system of grasses is obviously an effective response to selective environmental pressures. According to Schoen (1984), cleistogamy is favored because it increases the success of fertilization and results in the retrieval of the resource costs of producing male gametes and reproductive structures. The degree of cleistogamy, that is, the percentage of cleistogamous versus chasmogamous flowers produced by the plant, is a genetically variable trait which is capable of responding to natural selection for increasing or decreasing levels of cleistogamy (Clay 1983a). Clay (1983a) determined heretability estimates for Danthonia spicata (L.) Beauv. through genetic breeding studies both in the field and in the greenhouse, and deduced that cleistogamy is a multigenic trait. The

heretability estimates of Ø.53 for the natural population and Ø.71 for the greenhouse population indicate that Danthonia possesses a degree of cleistogamy adequate to remit the potential for responce to natural selection.

The primary limiting factor in the grassland ecosystem, available soil moisture, has been found to be influential in the production of cleistogamous inflorescences. Under controlled conditions, Brown (1952) compared the effects of available soil moisture on Stipa leucotricha grown under four different conditions of available water. An inverse relationship between the production of cleistogamous florets and available soil moisture was recorded; the less available soil moisture, the higher the percentage of cleistogamy. Brown (1952) concluded that the floral form that is actually produced by the plant is determined by a disruption in the usual equalibrium between the two conditions by crossing a determined threshold value in the amount of soil moisture during floral initiation.

Along with soil moisture, day length and light intensity have also been shown to be contributing factors to the cleistogamous condition. Langer and Wilson (1965) tested the effect of day length and temperature and the role of soil moisture in cleistogamous and chasmogamous flowers. Temperature was found to have almost no effect, but photoperiod and water availability apparently work together to strongly influence the flowering type. Under a long day (16 h light) regime, the flowers were almost exclusively cleistogamous, while the chasmogamous flowers were predominant under shorter photoperiods provided soil moisture was high. Langer and Wilson (1965) also reported that high atmospheric humidity appears to play a role in influencing the degree of chasmogamy, although this parameter was not measured experimentally. Similarly, Schoen (1984) demonstrated that a distinct threshold of low light intensity exists below which mostly cleistogamous flowers are produced.

The selective advantage or disadvantage of reproduction by chasmogamy and cleistogamy depends ultimately on the success of each type of progeny, thus conforming to the old darwinian idea of fitness. Success could be at the level of fertilization, seed set, seedling establishment, or adult survival and fecundity (Clay 1983b). According to Clay (1983b), seed set appears to be relatively equal for both types of systems,

therefore, both types appear to be fertilized successfully. However, the probability of flower maturation and seed set is lower for chasmogamous than cleistogamous flowers in many situations depending on environmental conditions. A chasmogamous flower has the benefit of contributing to offspring either through the transfer of its pollen to another plant or through the maturation of its own seeds. However, cleistogamous flowers possess the advantage of efficient and successful pollination and the seeds are energetically cheaper because large numbers are produced on reduced panicles (Bell & Quinn 1985).

The probability of flower maturation and seed set is lower for chasmogamous than cleistogamous flowers in situations in which the developing inflorescences are removed as in the case of grazing, mowing, or burning. Since chasmogamous flowers are predominantly situated higher on the inflorescence than cleistogamous flowers, they are most likely to be destroyed under these conditions. In contrast, the cleistogamous flowers are usually lower on the plant, and in some cases, even subterranean. Hence, these cleistogamous florets are unharmed. Therefore, cleistogamy is an advantageous selective response to these otherwise detrimental pressures.

Supportive evidence for this selection scheme is abundant particularly for grazing pressures. Clay (1983b) noted that the most frequently grazed Danthonia taxa in North Carolina also produce the highest percentage of cleistogamous flowers. Similarly, Conner (1979) noted that in areas with the greatest diversity of Danthonia and related genera in New Zealand and Australia, regions in which large grazing mammals were unknown before the advent of European settlers, no species produced cleistogamous flowers. In contrast, Danthonia species in North and South America, where grazing pressures have existed for a longer period of time, produce both chasmogamous and cleistogamous flowers.

In a comparative study of adjacent ungrazed and heavily grazed plots in East Texas, Dyksterhuis (1945) found that caryopses produced by cleistogamous spiklets in the basal sheaths of Stipa leucotricha, an important perennial forage grass, were responsible for propagating the species in its natural environment when subjected to heavy grazing. He showed that

under heavy grazing, Stipa may behave as an annual without producing flowering culms. This is accomplished by fall seedlings of cleistogamous origin producing new cleistogenes in spring and then succumbing to summer drought.

Dyksterhuis (1945) supplemented his natural observations with clipping experiments. Stipa plants that were clipped twice a week to a height of 1 1/2" produced very few tillers, and none produced flowering culms, while unclipped plants tillered into large clumps and 40% produced mature panicles. In addition, the clipped plants produced cleistogenes even though panicle development was prevented, but, the number of cleistogenes produced per plant was less than that of the unclipped plants. The cumulative results of Dyksterhuis' (1945) studies imply that cleistogamous production may largely account for the increasing percent coverage by Stipa under severe grazing on yearlong pastures and ranges. Maintaining such a cleistogamous phenotype which has distinct advantages for seeding winter pastures in cases where suitable cool season rhizomatous and stoloniferous species are not available should be considered in management techniques. Many cleistogamous strains could be kept pure in a limited space by removing flowering culms when they appear (Dyksterhuis 1945).

Another selective pressure to be reckoned with is competition. According to Bell and Quinn (1985), who studied three populations of Dichanthelium clandestinum (L.) Gould in a greenhouse experiment, no differences in fitness as measured by shoot biomass and spikelet number exist between chasmogamous and cleistogamous progeny produced by chasmogamous and cleistogamous seeds grown separately or intermixed at three different densities. Similar experiments with seedlings indicated no differences in fitness between the two types of progeny at any density when grown separately. However, chasmogamous plants were significantly heavier and possessed greater numbers of spikelets than cleistogamous plants at the lowest density of the mixtures. Bell and Quinn (1985) hypothesized that the increased competitive ability of the chasmogamous offspring in the low density mixture may have resulted from reduced sibling competition among the chasmogamous seedlings. In a competitive situation, the cleistogamous progeny, which have more similar genotypes, compete for similar resources. In contrast, the chasmogamous progeny may differ genetically from the cleistogamous progeny and among themselves so that competition

for resources is not as intense, especially at the lowest densities.

Dispersal and Colonization

The reduced sib competition noted by Bell and Quinn (1985) under experimental conditions parallels the competitive conditions afforded to seedlings by dispersal patterns. Seed types dispersed over greater distances experience less sib competition than do closely dispersed seed types (Schoen 1984). Since chasmogamous seeds are relatively small in size and weight, they are better adapted for long distance dispersal by wind. The larger cleistogamous seeds often remain attached to the culm and fall near the parental site, and thus are more successful at establishing sites located within their limited dispersal range.

Observed and expected ratios of chasmogamous and cleistogamous seedlings in the field imply that cleistogamous progeny are more successful than chasmogamous progeny (Campbell 1982; Clay 1983b; Schoen 1984). A comparison of cleistogamous and chasmogamous progeny reveals that production of cleistogamous progeny begins earlier in the season than chasmogamous production, but cleistogamous seeds are dispersed later than chasmogamous fruits. The germination of cleistogamous seeds is delayed longer than that of chasmogamous seeds since the former are dispersed within the spikelet and the latter are not. Also, the two types of progeny may face different growing conditions. These characteristics, plus the increased homozygosity which accompanies cleistogamy provides for greater adaptation to the local environment (Stebbins 1957; Allard 1975), and the greater fruit productivity of cleistogamous systems provide them with a distinct advantage for colonization of early successional and disturbed habitats.

Summary

The cleistogamous reproductive strategy in grasses is a responce to environmental pressures working on the genome. The production of cleistogamous florets is under the control of multiple genes, and expression of the trait, as well as the degree of expression, is triggered by stressful conditions.

Hence, low available soil moisture, intense grazing, mowing, and burning increase the degree of cleistogamy, thus insuring adequate reproductive potential. In addition, the increased survival capabilities allow these plants to be early colonizers of disturbed sites.

The loss of variability within the genome due to self-fertilization remains in check by the production of both cleistogamous and out-crossing chasmogamous florets on the same individual. This advantageous reproductive strategy has evolved through natural selection to insure the survival of many grass species under common, but adverse environmental conditions.

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Major Nomenclatural Changes in Guide to the Vascular Flora of Illinois Revised and Enlarged Edition

Robert H. Mohlenbrock

With the publication during the summer of 1986 of the Guide to the Vascular Flora of Illinois Revised and Enlarged edition, major nomenclatural changes have been made. This has been necessitated by recent published research whose findings the author concurs with, although sometimes reluctantly.

In order to learn the changes more quickly, and to find the whereabouts of some binomials, the following list gives the major nomenclatural changes. The first entry of each couplet is the binomial used in the 1975 edition of Guide to the Vascular Flora of Illinois. The second entry of each couplet is the binomial for the same taxon as it appears in the 1986 revised and enlarged edition. For simplicity, the first entries of the couplets are arranged alphabetically.

Acorus calamus L.
    Acorus americanus (Raf.) Raf.

Aesculus octandra Marsh.
    Aesculus flava Soland.

Agropyron subsecundum (Link) Hitchc.
    Agropyron trachycaulum (Link) Malte var. unilaterale (Vasey) Malte

Agrostis tenuis Sibth.
    Agrostis capillaris L.

Alisma subcordatum Raf.
    Alisma plantago-aquatica L. var. parviflorum (Pursh) Torr.

Allium mutabile Michx.
    Allium canadense L. var. _mobilense_ (Regel) Ownbey

Allium tricoccum Ait. var. _burdickii_ Hanes
    Allium burdickii (Hanes) A.G. Jones

Alnus rugosa (DuRoi) Spreng. var. _americana_ (Regel) Fern.
    Alnus incana (L.) Muench. ssp. _rugosa_ (DuRoi) Clausen

Althaea rosea (L.) Cav.
    Alcea rosea L.

Amaranthus torreyi (Gray) Benth.
    Amaranthus arenicola I.M. Johnston

Amaranthus tamarascinus Nutt.
    Amaranthus rudis Sauer

Andromeda glaucophylla Link
    Andromeda polifolia L. var. _glaucophylla_ (Link) DC.

Anemone patens L.
    Pulsatilla patens (L.) P. Mill. ssp. _multifida_ (Pritz.) Zamels

Anemonella thalictroides (L.) Spach.
    Thalictrum thalictroides (L.) Eaves & Boivin

Anthemis nobilis L.
    Chamaemelum nobilis (L.) All.

Arenaria lateriflora L.
    Moehringia lateriflora (L.) All.

Arenaria patula Michx.
    Minuartia patula (Michx.) Mattf.

Arenaria stricta Michx.
    Minuartia stricta (Michx.) Hiern.

Aristida necopina Shinners
    Aristida glauca (Nees) Walp.

Armoracia lapathifolia Gilib.
    Armoracia rusticana (Lam.) Gaertn., Meyer, & Scherb.

Asclepias lanuginosa Nutt.
    Asclepias otarioides Fourn.

Ascyrum hypericoides L.
    Hypericum hypericoides (L.) Crantz

Ascyrum hypericoides L. var. multicaule (Michx.) Fern.
    Hypericum stragulum P. Adams & Robson

Aster junciformis Rydb.
    Aster borealis (T. & G.) Prov.

Aster pioosus Willd. var. pringlei (Gray) Blake
    Aster pringlei (Gray) Britt.

Aster puniceus L. var. lucidulus Gray
    Aster firmus Nees

Aster ptarmicoides (Nees) Torr. & Gray
    Solidago ptarmicoides (Nees) Boivin

Aster sagittifolius Wedem. var. drummondii (Lindl.) Shinners
    Aster drummondii Lindl.

Astragalus goniatus Nutt.
    Astragalus agrestis Doug.

Astragalus trichocalyx Nutt.
    Astragalus crassicarpus Nutt. var. trichocalyx (Nutt.) Barneby

Athyrium filix-femina (L.) Roth var. asplenioides (Michx.) Farw.
    Athyrium asplenioides Michx.

Athyrium filix-femina (L.) Roth var. michauxii Spreng.
    Athyrium angustum (Willd.) Presl

Bacopa acuminata (Walt.) Small
    Mecardonia acuminata (Walt.) Small

Baptisia minor Lehm.
    Baptisia australis (L.) R. Br. var. minor (Lehm.) Fern.

Berula pusilla (Nutt.) Fern.
Berula erecta (Huds.) Coville

Betula lutea Michx. f.
Betula alleghaniensis Britt.

Bidens beckii Torr.
Megalodonta beckii (Torr.) Greene

Bidens comosa (Gray) Wieg.
Bidens tripartita L.

Bromus mollis L.
Bromus hordeaceus L.

Bromus willdenowii Kunth
Bromus catharticus Vahl

Cacalia tuberosa Nutt.
Cacalia plantaginea (Raf.) Shinners

Callitriche palustris L.
Callitriche verna L.

Calystegia sepium (L.) R. Br. var. fraterniflora (Mack. & Bush) Mohlenbr.
Calystegia silvatica (Kit.) Griseb. ssp. fraterniflorus (Mack. & Bush) Brummitt

Cassia tora L.
Cassia obtusifolia L.

Ceanothus ovatus Desf.
Ceanothus herbaceus Raf.

Centunculus minimus L.
Anagallis minima (L.) Krause

Cerastium brachypodum (Engelm.) B.L. Robins.
Cerastium nutans Raf. var. brachypodum Engelm.

Cerastium tetrandrum Curtis
Cerastium diffusum Pursh

Cerastium velutinum Raf.
Cerastium arvense L.

Cerastium viscosum L.
Cerastium glomeratum Thuill

Ceratophyllum echinatum Gray
Ceratophyllum muricatum Cham.

Chrysanthemum balsamita L.
Balsamita major Desf.

Chrysanthemum leucanthemum L.
Leucanthemum vulgare Lam.

Chrysanthemum parthenium (L.) Bernh.
Tanacetum parthenium (L.) Sch. Bip.

Circaea quadrisulcata (Maxim.) Franch. & Sav. var. *canadensis* (L.) Hara
Circaea lutetiana Aschers. & Magnus ssp. *canadensis* (L.) Aschers. & Magnus

Citrullus vulgaris Schrad.
Citrullus lanatus (Thunb.) Matsumura & Nakai

Cladrastis lutea (Michx. f.) K. Koch
Cladrastis kentuckea (Dum.-Cours.) Rudd

Clematis dioscoreifolia Lev. & Vaniot
Clematis terniflora DC.

Corydalis halei (Small) Fern. & Schub.
Corydalis micrantha (Engelm.) Gray ssp. *australis* (Chapm.) G.B. Ownbey

Corydalis montana (Engelm.) Gray
Corydalis aurea Willd. ssp. *occidentalis* (Engelm.) G.B. Ownbey

Cuphea petiolata (L.) Koehne
Cuphea viscosissima Jacq.

Cypripedium calceolus L. var. parviflorum (Salisb.) Fern.
    Cypripedium parviflorum Salisb.

Cypripedium calceolus L. var. pubescens (Willd.) Correll
    Cypripedium pubescens Willd.

Dalea alopecuroides Willd.
    Dalea leporina (Ait.) Bullock

Delphinium ajacis L.
    Consolida ambigua (L.) Ball & Heywood

Dioclea multiflora (Torr. & Gray) C. Mohr
    Galactia mohlenbrockii Maxwell

Draba reptans (Lam.) Fern. var. micrantha (Nutt.) Fern.
    Draba reptans (Lam.) Fern. ssp. stellifera (O.E. Schulz) Abrams

Draba verna L.
    Eriophila verna (L.) Chev.

Draba verna L. var. boerhaavii Van Hall
    Eriophila verna (L.) Chev. ssp. praecox (Stevens) S.M. Walters

Echinochloa frumentacea (Roxb.) Link
    Echinochloa crus-galli (L.) Beauv. var. frumentacea (Roxb.) W. Wight

Echinochloa pungens (Poir.) Rydb.
    Echinochloa muricata (Beauv.) Fern.

Echinochloa pungens (Poir.) Rydb. var. wiegandii Fassett
    Echinochloa muricata (Beauv.) Fern. var. wiegandii Fassett

Eclipta alba (L.) Hassk.
    Eclipta prostrata (L.) L.

Eleocharis caribaea (Rottb.) Blake
    Eleocharis geniculata (L.) Roem. & Schultes

Eleocharis tenuis Schult. var. verrucosa (Svenson) Svenson
Eleocharis verrucosa (Svenson) Fern.

Elodea densa (Planch.) Caspary
Egeria densa Planch.

Eragrostis poaeoides Beauv.
Eragrostis minor Host.

Erigeron canadensis L.
Conyza canadensis (L.) Cronq.

Erigeron divaricatus Michx.
Conyza ramosissima Cronq.

Eriochloa gracilis (Fourn.) Hitchcock
Eriochloa lemmonii Vasey & Scribn. var. gracilis (Fourn.) Gould

Eruca sativa Mill.
Eruca vesicaria (L.) Cav.

Falcaria sioides (Wibel) Aschers.
Falcaria vulgaris Bernh.

Festuca ovina L. var. duriuscula (L.) Koch
Festuca duriuscula L.

Fimbristylis baldwiniana (Schult.) Torr.
Fimbristylis annua (All.) Roem. & Schultes

Galactia volubilis (L.) Britt. var. mississippiensis Vail
Galactia regularis (L.) BSP.

Galinsoga ciliata (Raf.) Blake
Galinsoga quadriradiata R. & P.

Gentiana crinita Froel.
Gentianopsis crinita (Froel.) Ma

Gentiana procera Holm
Gentianopsis procera (Holm) Ma

Gentiana quinquefolia L. var. occidentalis (Gray) Hitchc.
Gentianella quinquefolia (L.) Small ssp. occidentalis (Gray) J. Gillett

Gerardia aspera Dougl.
Agalinis aspera (Dougl.) Britt.

Gerardia auriculata Michx.
Tomanthera auriculata (Michx.) Raf.

Gerardia fasciculata Ell.
Agalinis fasciculata Ell.

Gerardia flava L.
Aureolaria flava (L.) Farw.

Gerardia gattingeri Small
Agalinis gattingeri (Small) Small

Gerardia grandiflora Benth. var. pulchra (Pennell) Fern.
Aureolaria grandiflora (Benth.) Pennell var. pulchra Pennell

Gerardia paupercula Gray
Agalinis paupercula (Gray) Britt.

Gerardia pedicularia L. var. ambigens Fern.
Aureolaria pedicularia L. var. ambigens (Fern.) Farw.

Gerardia purpurea L.
Agalinis purpurea (L.) Pennell

Gerardia skinneriana Wood
Agalinis skinneriana (Wood) Britt.

Gerardia tenuifolia Vahl
Agalinis tenuifolia (Vahl) Raf.

Gerardia tenuifolia Vahl var. macrophylla Benth.
Agalinis besseyana Benth.

Geum strictum Ait.
Geum aleppicum Jacq.

Gillenia stipulata (Muhl.) Baill.
Porteranthus stipulatus (Muhl.) Britt.

Gnaphalium macounii Greene
Gnaphalium viscosum HBK.

Habenaria blephariglottis (Willd.) Hook.
Platanthera blephariglottis (Willd.) Lindl.

Habenaria ciliaris (L.) R. Br.
Platanthera ciliaris (L.) Lindl.

Habenaria clavellata (Michx.) Spreng.
Platanthera clavellata (Michx.) Luer

Habenaria dilatata (Pursh) Hook.
Platanthera dilatata (Pursh) Lindl.

Habenaria flava (L.) R. Br.
Platanthera flava (L.) Lindl.

Habenaria flava (L.) R. Br. var. herbiola (R. Br.) Ames & Correll
Platanthera flava (L.) Lindl. var. herbiola (R. Br.) Luer

Habenaria hookeri Torr.
Platanthera hookeri (Torr.) Lindl.

Habenaria hyperborea (L.) R. Br. var. huronensis (Nutt.) Farw.
Platanthera hyperborea (L.) Lindl. var. huronensis (Nutt.) Luer

Habenaria lacera (Michx.) Lodd.
Platanthera lacera (Michx.) G. Don

Habenaria leucophaea (Nutt.) Gray
Platanthera leucophaea (Nutt.) Lindl.

Habenaria orbiculata (Pursh) Torr.
Platanthera orbiculata (Pursh) Lindl.

Habenaria peramoena Gray
Platanthera peramoena (Gray) Gray

Habenaria psycodes (L.) Spreng.
Platanthera psycodes (L.) Lindl.

Habenaria viridis (L.) R. Br. var. bracteata (Muhl.) Gray
Coeloglossum viride (L.) Hartm.

Hackelia americana (Gray) Fern.
Hackelia deflexa (Wahlenb.) Opiz var. americana (Gray) Fern. & I.M. Johnston

Haplopappus ciliatus (Nutt.) DC.
Prionopsis ciliatus Nutt.

Heracleum maximum Bartr.
Heracleum lanatum Michx.

Heuchera hirsuticaulis (Wheelock) Rydb.
Heuchera americana L. var. hirsuticaulis (Wheelock) Rosend., Butt. & Lak.

Heterotheca villosa (Pursh) Shinners
Heterotheca camporum (Greene) Shinners

Hibiscus esculentus L.
Abelmoschus esculentus (L.) Moench.

Hibiscus militaris Cav.
Hibiscus laevis All.

Hibiscus palustris L.
Hibiscus moschuetos L.

Hieracium pratense Tausch
Hieracium caespitosum Dumort.

Hordeum X montanense Scribn.
Elyhordeum X montanense (Scribn.) Bowden

Houstonia caerulea L.
Hedyotis caerulea (L.) Hook.

Houstonia longifolia Gaertn.
Hedyotis longifolia (Gaertn.) Hook.

Houstonia longifolia Gaertn. var. ciliolata (Torr.) Torr.
Hedyotis longifolia (Gaertn.) Hook. var. ciliolata (Torr.) Mohlenbr.

Houstonia longifolia Gaertn. var. tenuifolia (Nutt.) Wood
Hedyotis nuttalliana Fosberg

Houstonia minima Beck
    Hedyotis crassifolia Raf.

Houstonia nigricans (Lam.) Fern.
    Hedyotis nigricans (Lam.) Fosberg

Houstonia purpurea L.
    Hedyotis purpurea (L.) Torr. & Gray

Houstonia purpurea L. var. calycosa Gray
    Hedyotis purpurea (L.) Torr. & Gray var. calycosa (Gray) Fosberg

Houstonia pusilla Schoepf.
    Hedyotis pusilla (Schoepf.) Mohlenbr.

Hypericum punctatum Lam. var. pseudomaculatum (Bush) Fern.
    Hypericum pseudomaculatum Bush

Hypericum spathulatum (Spach) Steud.
    Hypericum prolificum L.

Impatiens biflora Walt.
    Impatiens capensis Meerb.

Isanthus brachiatus (L.) BSP.
    Trichostema brachiatum L.

Jussiaea decurrens (Walt.) DC.
    Ludwigia decurrens Walt.

Jussiaea leptocarpa Nutt.
    Ludwigia leptocarpa (Nutt.) Hara

Jussiaea repens L. var. glabrescens Ktze.
    Ludwigia peploides (HBK.) Raven ssp. glabrescens (Ktze.) Raven

Kallstroemia intermedia Rydb.
    Kallstroemia parviflora J.B.S. Nelson

Krigia oppositifolia Raf.
    Krigia caespitosa (Raf.) Chambers

Lathyrus myrtifolius Muhl.
    Lathyrus palustris L. var. myrtifolius (Muhl.) Gray

Lemna minima Phil.
    Lemna minuta HBK.

Lespedeza stipulacea Maxim.
    Kummerowia stipulacea (Maxim.) Makino

Lespedeza striata (Thunb.) Hook. & Arn.
    Kummerowia striata (Thunb.) Schindl.

Linaria canadensis (L.) Dum.-Cours. var. texana (Scheele) Pennell
    Linaria texana Scheele

Linaria dalmatica (L.) Mill.
    Linaria genistifolia (L.) Mill. ssp. dalmatica (L.) Maire & Petitmengin

Lindernia anagallidea (Michx.) Pennell
    Lindernia dubia (L.) Pennell var. anagallidea (Michx.) Cooperrider

Linnaea americana Forbes
    Linnaea borealis L. ssp. americana (Forbes) Hulten

Lippia cuneifolia (Torr.) Steud.
    Phyla cuneifolia (Torr.) Greene

Lippia lanceolata Michx.
    Phyla lanceolata (Michx.) Greene

Lithospermum arvense L.
    Buglossoides arvense (L.) I.M. Johnston

Lycium halimifolium Mill.
    Lycium barbarum L.

Lycopodium flabelliforme (Fern.) Blanch.
    Lycopodium digitatum A. Br.

Lysimachia lanceolata Walt. var. hybrida (Michx.) Gray
    Lysimachia hybrida Michx.

Malaxis monophylla (L.) Sw. var. brachypoda (Gray) F. Morris
Malaxis brachypoda (Gray) Fern.

Malus coronaria (L.) var. lancifolia Rehd.
Malus coronaria (L.) Mill. var. dasycalyx Rehd.

Matricaria maritima L.
Matricaria perforata L.

Mazus japonicus (Thunb.) Kuntze
Mazus pumilus (Burm. f.) Steenis

Mentha X alopecuroides Hull
Mentha X villosa Huds.

Microseris cuspidata (Pursh) D. Dietr.
Nothocalais cuspidata (Pursh) Sch. Bip.

Myosotis virginica (L.) BSP.
Myosotis verna Nutt.

Myosotis virginica (L.) BSP. var. macrosperma (Engelm.) Fern.
Myosotis macrosperma Engelm.

Oenothera cruciata Nutt.
Oenothera parviflora L.

Oenothera missouriensis Sims
Oenothera macrocarpa Nutt.

Oenothera serrulata Nutt.
Calylophus serrulatus (Nutt.) Raven

Oenothera tetragona Roth
Oenothera fruticosa L. ssp. glauca (Michx.) Straley

Onosmodium occidentale Mack.
Onosmodium molle Michx. ssp. occidentale (Mack.) Cochrane

Panicum boreale Nash
Dichanthelium boreale (Nash) Freckm.

<u>Panicum</u> <u>boscii</u> Poir.
    <u>Dichanthelium</u> <u>boscii</u> (Poir.) Gould & Clark

<u>Panicum</u> <u>boscii</u> Poir. var. <u>molle</u> (Vasey) Hitchc. & Chase
    <u>Dichanthelium</u> <u>boscii</u> (Poir.) Gould & Clark var. <u>molle</u> (Vasey) Mohlenbr.

<u>Panicum</u> <u>clandestinum</u> L.
    <u>Dichanthelium</u> <u>clandestinum</u> (L.) Gould

<u>Panicum</u> <u>columbianum</u> Scribn.
    <u>Dichanthelium</u> <u>columbianum</u> (Scribn.) Freckm.

<u>Panicum</u> <u>commutatum</u> Schult.
    <u>Dichanthelium</u> <u>commutatum</u> (Schult.) Gould

<u>Panicum</u> <u>commutatum</u> Schult. var. <u>ashei</u> Fern.
    <u>Dichanthelium</u> <u>commutatum</u> (Schult.) Gould var. <u>ashei</u> (Fern.) Mohlenbr.

<u>Panicum</u> <u>depauperatum</u> Muhl.
    <u>Dichanthelium</u> <u>depauperatum</u> (Muhl.) Gould

<u>Panicum</u> <u>dichotomum</u> L.
    <u>Dichanthelium</u> <u>dichotomum</u> (L.) Gould

<u>Panicum</u> <u>joori</u> Vasey
    <u>Dichanthelium</u> <u>joori</u> (Vasey) Mohlenbr.

<u>Panicum</u> <u>lanuginosum</u> Ell.
    <u>Dichanthelium</u> <u>acuminatum</u> (Sw.) Gould & Clark var. <u>fasciculatum</u> (Torr.) Freckm.

<u>Panicum</u> <u>lanuginosum</u> Ell. var. <u>inmplicatum</u> (Scribn.) Fern.
    <u>Dichanthelium</u> <u>acuminatum</u> (Sw.) Gould & Clark var. <u>fasciculatum</u> (Torr.) Freckm.

<u>Panicum</u> <u>lanuginosum</u> Ell. var. <u>lindheimeri</u> (Nash) Fern.
    <u>Dichanthelium</u> <u>acuminatum</u> (Sw.) Gould & Clark var. <u>lindheimeri</u> (Nash) Gould & Clark

<u>Panicum</u> <u>lanuginosum</u> Ell. var. <u>septentrionale</u> (Fern.) Fern.
    <u>Dichanthelium</u> <u>acuminatum</u> (Sw.) Gould & Clark var. <u>lindheimeri</u> (Nash) Gould & Clark

<u>Panicum</u> <u>latifolium</u> L.
<u>Dichanthelium</u> <u>latifolium</u> (L.) Gould & Clark

<u>Panicum</u> <u>laxiflorum</u> Lam.
<u>Dichanthelium</u> <u>laxiflorum</u> (Lam.) Gould

<u>Panicum</u> <u>leibergii</u> (Vasey) Scribn.
<u>Dichanthelium</u> <u>leibergii</u> (Vasey) Freckm.

<u>Panicum</u> <u>linearifolium</u> Scribn.
<u>Dichanthelium</u> <u>linearifolium</u> (Scribn.) Gould

<u>Panicum</u> <u>linearifolium</u> Scribn. var. <u>werneri</u> (Scribn.) Fern.
<u>Dichanthelium</u> <u>linearifolium</u> (Scribn.) Gould var. <u>werneri</u> (Scribn.) Mohlenbr.

<u>Panicum</u> <u>malacophyllum</u> Nash
<u>Dichanthelium</u> <u>malacophyllum</u> (Nash) Gould

<u>Panicum</u> <u>mattamuskeetense</u> Ashe
<u>Dichanthelium</u> <u>mattamuskeetense</u> (Ashe) Mohlenbr.

<u>Panicum</u> <u>meridionale</u> Ashe
<u>Dichanthelium</u> <u>meridionale</u> (Ashe) Freckm.

<u>Panicum</u> <u>microcarpon</u> Muhl.
<u>Dichanthelium</u> <u>microcarpon</u> (Muhl.) Mohlenbr.

<u>Panicum</u> <u>nitidum</u> Lam.
<u>Dichanthelium</u> <u>nitidum</u> (Lam.) Mohlenbr.

<u>Panicum</u> <u>oligosanthes</u> Schult.
<u>Dichanthelium</u> <u>oligosanthes</u> (Schult.) Gould

<u>Panicum</u> <u>oligosanthes</u> Schult. var. <u>helleri</u> (Nash) Fern.
<u>Dichanthelium</u> <u>oligosanthes</u> (Schult.) Gould var. <u>helleri</u> (Nash) Mohlenbr.

<u>Panicum</u> <u>oligosanthes</u> Schult. var. <u>scribnerianum</u> (Nash) Fern.
<u>Dichanthelium</u> <u>oligosanthes</u> (Schult.) Gould. var. <u>scribnerianum</u> (Nash) Gould

<u>Panicum</u> <u>perlongum</u> Nash
<u>Dichanthelium</u> <u>perlongum</u> (Nash) Freckm.

Panicum polyanthes Schult.
Dichanthelium polyanthes (Schult.) Mohlenbr.

Panicum praecocius Hitchc. & Chase
Dichanthelium praecocius (Hitchc. & Chase) Freckm.

Panicum ravenelii Scribn. & Merr.
Dichanthelium ravenelii (Scribn. & Merr.) Gould

Panicum scoparioides Ashe
Dichanthelium X scoparioides (Ashe) Mohlenbr.

Panicum scoparium Lam.
Dichanthelium scoparium (Lam.) Gould

Panicum sphaerocarpon Ell.
Dichanthelium sphaerocarpon (Ell.) Gould

Panicum subvillosum Ashe
Dichanthelium acuminatum (Sw.) Gould & Clark var. fasciculatum (Torr.) Freckm.

Panicum villosissimum Nash
Dichanthelium villosissimum (Nash) Freckm.

Panicum villosissimum Nash var. pseudopubescens (Nash) Fern.
Dichanthelium villosissimum (Nash) Freckm. var. pseudopubescens (Nash) Mohlenbr.

Panicum wilcoxianum Vasey
Dichanthelium wilcoxianum (Vasey) Freckm.

Panicum yadkinense Ashe
Dichanthelium yadkinense (Ashe) Mohlenbr.

Parthenocissus vitacea (Knerr) Hitchc.
Parthenocissus inserta (Kerner) K. Fritsch

Peplis diandra Nutt.
Didiplis diandra (DC.) Wood

Petalostemum candidum (Willd.) Michx.
Dalea candida (Michx.) Willd.

Petalostemum foliosum Gray
    Dalea foliosa (Gray) Barneby

Petalostemum purpureum (Vent.) Rydb.
    Dalea purpurea Vent.

Phoradendron flavescens (Pursh) Nutt.
    Phoradendron serotinum (Raf.) M.C. Johnst.

Plantago indica L.
    Plantago arenaria Waldst. & Kit.

Plantago purshii Roem. & Schultes
    Plantago patagonica Jacq. var. brevicarpa (Shinners) Shinners

Polianthes virginica (L.) Shinners
    Manfreda virginica (L.) Rose

Polygonum aviculare L.
    Polygonum arenastrum Boreau

Polygonum coccineum Muhl.
    Polygonum amphibium L.

Polypodium vulgare L. var. virginianum (L.) Eaton
    Polypodium virginianum L.

Prunella vulgaris L. var. lanceolata (Bart.) Fern.
    Prunella vulgaris L. var. elongata Benth.

Puccinellia pallida (Torr.) Clausen
    Torreyochloa pallida (Torr.) Church

Pyrola secunda L.
    Orthilia secunda (L.) House

Quercus pagodaefolia (Ell.) Ashe
    Quercus pagoda Raf.

Ribes sativum (Reichenb.) Syme
    Ribes rubrum L.

Rosa lunellii Greene
    Rosa arkansana Porter

Rosa pimpinellifolia L.
Rosa spinosissima L.

Rubus occidualis Bailey
Rubus roribaccus (Bailey) Rydb.

Rudbeckia amplexicaulis Vahl
Dracopsis amplexicaulis (Vahl) Chase

Rudbeckia fulgida Ait. var. missouriensis (Engelm.) Cronq.
Rudbeckia missouriensis Engelm.

Salix interior Rowlee
Salix exigua Nutt.

Salsola kali L. var. tenuifolia Tausch
Salsola iberica Sennen & Pav.

Salvia sylvestris L.
Salvia nemorosa L.

Sambucus pubens Michx.
Sambucus racemosa L. ssp. pubens (Michx.) House

Saponaria vaccaria L.
Vaccaria pyramidata Medic.

Scutellaria epilobiifolia Muhl.
Scutellaria galericulata L.

Scutellaria parvula Michx. var. australis Fassett
Scutellaria australis (Fassett) Epling

Scutellaria parvula Michx. var. leonardii (Epling) Fern.
Scutellaria leonardii Epling

Sesbania exaltata (Raf.) Cory
Sesbania macrocarpa Muhl.

Setaria lutescens (Weigel) Hubb.
Setaria glauca (L.) Beauv.

Seymeria macrophylla Nutt.
Dasistoma macrophylla (Nutt.) Raf.

Solanum americanum Mill
Solanum ptycanthum Dunal

Solanum rostratum Dunal
Solanum cornutum Lam.

Solanum torreyi Gray
Solanum dimidiatum Sendt.

Solidago bicolor L. var. concolor Torr. & Gray
Solidago hispida Muhl.

Solidago graminifolia (L.) Salisb.
Euthamia graminifolia (L.) Salisb.

Solidago graminifolia (L.) Salisb. var. remota (Greene) Harris
Euthamia tenuifolia (Pursh) Greene

Solidago gymnospermoides (Greene) Fern.
Euthamia gymnospermoides Greene

Specularia biflora (R. & P.) Fisch. & Mey.
Triodanis perfoliata (L.) Nieuwl. var. biflora (R. & P.) Bradley

Specularia leptocarpa (Nutt.) Gray
Triodanis leptocarpa (Nutt.) Nieuwl.

Specularia perfoliata (L.) A. DC.
Triodanis perfoliata (L.) Nieuwl.

Sphaeralcea angusta (Gray) Fern.
Sidopsis hispida (Pursh) Rydb.

Spirodela oligorhiza (Kurtz) Hegelm.
Spirodela punctata (Mey.) C.H. Thompson

Stachys hyssopifolia Michx. var. ambigua Gray
Stachys aspera Michx.

Stachys riddellii House
Stachys nuttallii Shuttlw.

Swertia caroliniensis (Walt.) Kuntze
    Frasera caroliniensis Walt.

Teucrium canadense L. var. occidentale (Gray) McClintock & Epling
    Teucrium canadense L. var. boreale (Bickn.) Shinners

Thelypteris hexagonoptera (Michx.) Watt.
    Phegopteris hexagonoptera (Michx.) Fee

Thelypteris phegopteris (L.) Slosson
    Phegopteris connectilis (Michx.) Watt.

Tunica saxifraga (L.) Scop.
    Petrorhagia saxifraga (L.) Link

Vaccinium vacillans Torr.
    Vaccinium pallidum Ait.

Valeriana ciliata Torr. & Gray
    Valeriana edulis Nutt. ssp. ciliata (Torr. & Gray) F.G. Mey.

Valeriana uliginosa (Torr. & Gray) Rydb.
    Valeriana sitchensis Bong. ssp. uliginosa (Torr. & Gray) F.G. Mey.

Valerianella olitoria (L.) Poll.
    Valerianella locusta (L.) Betcke

Verbena canadensis (L.) Britt.
    Glandularia canadensis (L.) Nutt.

Verbena peruviana (L.) Britt.
    Glandularia peruviana (L.) Small

Vicia angustifolia Reich.
    Vicia sativa L. ssp. nigra (L.) Ehrh.

Vigna sinensis (L.) Endl.
    Vigna unguiculata (L.) Walp.

Viola canadensis L. var. rugulosa (Greene) C.L. Hitchc.
    Viola canadensis L. var. corymbosum Nutt.

Viola cucullata Marsh.
    Viola obliqua Hill

Viola papilionacea Pursh
    Viola pratincola Greene

Viola pratincola Greene f. albiflora (Glover) Mohlenbr.
    Viola priceana Pollard

Wisteria floribunda (Willd.) DC.
    Rehsonia floribunda (Willd.) Stritch

Wisteria sinensis (Sims) Sweet
    Rehsonia sinensis (Sims) Stritch

Wolffia papulifera C.H. Thompson
    Wolffia braziliensis Weddell

Wolffiella floridana (J.D. Sm.) C.H. Thompson
    Wolffiella gladiata (Hegelm.) Hegelm.

Wulfenia bullii (Eat.) Barnh.
    Besseya bullii (Eat.) Rydb.

Xanthocephalum dracunculoides (DC.) Shinners
    Amphiachyris dracunculoides (DC.) Nutt.

Xanthocephalum texanum (DC.) Shinners
    Gutierrezia texana (DC.) Torr. & Gray

Yucca filamentosa L. var. smalliana (Fern.) Ahles
    Yucca flaccida Haw.

Zigadenus glaucus Nutt.
    Zigadenus venenosus S. Wats. var. gramineus (Rydb.) Walsh

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Cover Photo: Liatris scariosa var. niewlandii (photo: M.L. Bowles)

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THE ILLINOIS STATUS OF *LIATRIS SCARIOSA* (L.) WILLD. VAR. *NIEUWLANDII* LUNELL A NEW THREATENED SPECIES FOR ILLINOIS

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ABSTRACT

Through a field and herbarium study, Illinois references to _Liatris_ X _nieuwlandii_ (Lunell) Gaiser, _L_. X _sphaeroidea_ Michx., and _L_. _ligulistylis_ (Nels) K. Schum. are referred to _L_. _scariosa_ (L.) Willd. var. _nieuwlandii_ Lunell. In Illinois, we found _L_. _scariosa_ to be temporally and spatially isolated from other _Liatris_. It flowers in early fall, and essentially is restricted to remnant savannas on transitional forest-prairie silt loam soils derived from Wisconsinan aged glacial materials. Eleven populations of this _Liatris_ are known to occur in a few northeastern and west-central Illinois counties. Because of continued loss and degradation of its savanna habitat, this species now is threatened with extirpation from Illinois.

INTRODUCTION AND PROBLEM

The genus Liatris Schreb. (Blazing-star) is a taxonomically difficult and genetically variable group of species, varieties, and putative hybrids. In the northeastern United States, Fernald (1950) recognized 18 species and 9 varieties, while Gleason (1952) included 15 species and 6 varieties of this genus. Midwestern Liatris occupy prairie or savanna habitats, and often are isolated from hybridization by different ecological requirements or flowering times (Menhusen 1973). However, considerable hybridization may occur (Gaiser 1951), especially when habitats overlap, such as in the Illinois Lake Michigan Dunes (Levin 1967, 1968).

Illinois botanists (e.g., Swink and Wilhelm 1979) have recognized a poorly understood and rare Liatris that occurs in mesic grassland or savanna habitats in a few northeastern and west-central Illinois counties. In comparison to related species, this plant is characterized by large, campanulate, pedunculate heads, herbaceous middle involucral bracts, and often broad lower leaves. Illinois material of this Liatris keys imperfectly in Gaiser (1946) and Fernald (1950) toward L. borealis Nutt., L. ligulistylis (Nels.) K. Schum. (including L. X nieuwlandii), or to L. aspera Michx. (including L. X sphaeroidea Michx.). In modern Illinois floras, references to this morphology have been treated with L. aspera Michx. as L. X nieuwlandii (Lunell) Gaiser (by Jones 1963) or as L. X sphaeroidea Michx. (by Mohlenbrock 1986). Also, Wunderlin (1966) recognized it as L. ligulistylis (Nels.) K. Schum., within which Mohlenbrock (1986) includes L. X nieuwlandii (Lunell) Gaiser. In contrast, Gleason (1952) followed Shinners (1943) in recognizing morphologies similar to our Illinois material as L. novae-angliae

Shinners var. nieuwlandii (Lunell) Shinners. In a more recent treatment, Cronquist (1980) follows Lunell (1912) in treating this taxon as L. scariosa (L.) Willd. var. nieuwlandii Lunell.

Recent studies in Chicago region savannas (Packard 1988) and an update of Illinois endangered and threatened species (Bowles 1987) led us to re-evaluate the taxonomic and ecological status of this blazing-star in Illinois. Our initial observations were that it differed from the closely allied Liatris aspera by association with bur and white oak savannas, and a fall period of anthesis. These distinct habitat and phenological niches in part support Fernald's (1950) observations of phenological and ecological isolation for L. X nieuwlandii.

We initiated herbarium research on this blazing-star in order to determine its former Illinois distribution, and if it has uniform taxonomic features. Field studies also were conducted to determine its current Illinois distribution, its ecological characteristics, and its potential endangered or threatened status in Illinois.

METHODS

Herbarium studies

Herbarium specimens (primarily those labeled *Liatris scariosa*, *L. ligulistylis*, *L.* X *nieuwlandii*, *L.* X *sphaeroidea*, *L. aspera*, and *L. scabra*) were examined at: Morton Arboretum (MOR), Field Museum (F), University of Illinois (ILL), Illinois Natural History Survey (ILLS), Illinois State Museum (ISM), Southern Illinois University (SIU), and Missouri Botanical Garden (MO); specimens also were obtained on loan from the New York State Museum (NYS). Herbarium abbreviations follow Holmgren *et al.* (1981).

Collection data (original identification, annotations, collector, collection date, locality, and herbarium) were recorded from Illinois collections of *Liatris scariosa*. Information also was obtained from The Illinois Nature Preserves Commission (Meyer 1986), personal interviews, and published literature (*e.g.*, Wunderlin 1966, Schwegman 1972).

In assessing key characteristics used by various authorities, we agree with Shinners (1943) that species variability, hybridization, minor taxonomic importance of some obvious variations, and scanty representation of some species in herbaria contribute to difficulty in understanding the *L. scariosa* group. The necessity of considering characters in combination is a key feature, as the break in a single character between two species may be obscured by an unimportant obvious feature (Shinners 1943). All specimens were compared and sorted by their labeled identity, and by geographic region of collection. Illinois specimens were sorted further by the following

sequential key that we derived from Shinners (1943), Fernald (1950), and Cronquist (1980).

1) Pappus plumose: Sec. Euliatris DC. in Fernald (1950).

1) Pappus barbellate. Sec. Suprago (Cass.) DC. in Fernald (1950).

2) Heads cylindric to narrowly turbinate-campanulate: Ser. Spicatae & Pycnostachyae (E.J. Alex.) Gaiser in Fernald (1950).

2) Heads broadly turbinate-campanulate to hemispheric: Ser. Scariosae (E.J. Alex.) Gaiser in Fernald (1950).

3) Middle involucral bracts bullate, glabrous abaxially, with broad, uneven, irregularly lacerate, eciliate, scarious margins.

4) Heads campanulate or hemispheric, corolla tube glabrous within: L. ligulistylis (Nels.) K. Schum.

4) Heads subglobose, corolla tube pilose within: L. aspera Michx.

3) Middle involucral bracts non-bullate, glabrous, hirsutulous, or cinereous abaxially, coriaceous, or herbaceous with uniformly narrow, entire, slightly erose, or ciliate scarious borders.

4) Heads small, with fewer than 25 flowers: L. squarrulosa Michx. (including L. scabra (Greene) K. Schum.)

4) Heads large, 25-80 (or more) flowered: L. scariosa (L.) Willd, including three varieties, among which var. nieuwlandii Lunell is said to occur in inland United States (Cronquist 1980).

Also, we examined _L. scariosa_ (primarily MOR specimens) for the character of corolla tube pilosity, which can lead to the following identifications, _sensu_ Gaiser (1946) and Fernald (1950):

1) Corolla tube pilose within: _L. X sphaeroidea_ (one putative parent = _L. aspera_).

2) Corolla tube glabrous within: _L. X nieuwlandii_ (one putative parent = _L. ligulistylis_).

Field studies.

Sites believed to support extant populations of this blazing-star were visited during October-November 1987. Representative collections from larger populations were deposited at MOR. Population census and ecological information were collected at sites containing blazing-stars. Populations were censused by counts or estimates of the number of flowering plants; non-flowering plants were neither identified or censused. Ecological data included natural plant community descriptions (_sensu_ White and Madany 1978), community dominants, and specific associates. The protection status, threats, and management needs of each population were noted. County soils maps and regional geological literature were consulted for additional habitat information.

RESULTS

Taxonomy and nomenclature

Thirty-five voucher specimens from seventeen Illinois counties (Appendix I) were found almost uniformly to fit the description of Liatris scariosa (L.) Willd. var. nieuwlandii Lunell (Cronquist 1980). Illinois plants were found to be characterized by numerous stem leaves, and often broad lower leaves; large, campanulate, and pedunculate heads, the uppermost often larger; and herbaceous, non-bullate, often ciliate-margined involucral bracts without strongly lacerate scarious borders. Gaiser (1946) suggested that this midwestern element was a hybrid, with L. aspera or L. ligulistylis as respective parents. However, we agree with Lunell (1912) and Cronquist (1980) that it represents L. scariosa.

Among specimens, density of inner corolla tube pilosity was variable, and some plants had entirely glabrous inner corolla tubes. Evidently this is a facultative trait within an otherwise uniform morphology, and does not necessarily imply hybrid origin. Corolla tube pilosity may be useful in separating Liatris ligulistylis (glabrous) from L. aspera (pilose), and identifying hybrids between these species. In herbarium specimens, the relatively large terminal flowering head, and usually larger and more lacerate middle phyllaries of L. ligulistylis also helped distinguish it from L. aspera.

We found no Illinois specimens that closely resembled Liatris ligulistylis as described by Shinners (1943) or Fernald (1950). The range of this species is

to the north and west of Illinois, where it is reported to occur in prairie wetlands (Shinners 1943). Johnson and Iltis (1963) record L. ligulistylis and related hybrids from southeast Wisconsin. Their near proximity to Illinois may represent a source for putative hybrids containing characters of L. ligulistylis reported by Levin (1968) from Lake Co. We interpret other Illinois references (Wunderlin 1966, Schwegman 1972, Mohlenbrock 1986) to L. ligulistylis as based on specimens of L. scariosa var. nieuwlandii.

Distribution and ecology

Liatris scariosa is known from 17 Illinois counties (Figure 1). This plant has a bicentric distribution in Illinois, with a few Chicago region stations and a more widespread occurrence in west-central Illinois. Liatris scabra (Greene) K. Schum., which Cronquist (1980) places in synonymy with Liatris squarrulosa Michx., appears to replace this species southward. For example, all Evers (ILLS) specimens labeled L. nieuwlandii from Clay, Effingham, Fayette, Jefferson, and Marion counties examined during this study have been referred to L. scabra. The Southern Till Plain Natural Division of Illinois (Schwegman et al. 1973) appears to limit the southern distribution of L. scariosa in Illinois. This boundary represents an edaphic transition from essentially Wisconsinan-aged soils to the older, more leached soils of southern Illinois and evidently is a migration barrier to distribution of other Illinois plants (e.g., Sheviak 1974).

The eleven extant Illinois populations of L. scariosa var. nieuwlandii (Table 1) are essentially restricted to mesic savanna on the silt loam (or eroded clay loam) soils of well-drained morainic ridges or dissected till plains.

Table 1. Distribution, site ownership/management status, and population sizes for Liatris scariosa var. nieuwlandii in Illinois. Historic records status: EXA = extant, UNK = unknown, EXI = presumed extirpated. POP SIZE: population estimates are based on flowering plants censused in 1987. < = less than.

COUNTY	HISTORIC RECORDS			OWNERSHIP/MANAGEMENT	POP.
	EXA	UNK	EXI	OF EXTANT POPULATIONS	SIZE
Adams		1	1	Cook Co.	
Brown		1		public/unmanaged	<15
Cass			1	public/unmanaged	<150
Calhoun		1	1	public/unmanaged	<150
Cook	4	1	5	public/managed	<10
Fulton			1		
Hancock			1	Macon Co.	
Macon	1			private/umanaged	1
Macoupin	2		3		
				Macoupin Co.	
Macoupin	2		3	private/unmanaged	2
McDonough			1	private(?)/unmanaged	10
McLean		1			
Menard			2	Montgomery Co.	
Montgomery	2			public/unmanaged	1
				public/managed	25
Pike			2		
Sangamon			2	Will Co.	
Schuyler			1	public/managed	<100
Will	2			public/unmanaged	3
TOTALS	11	5	21		

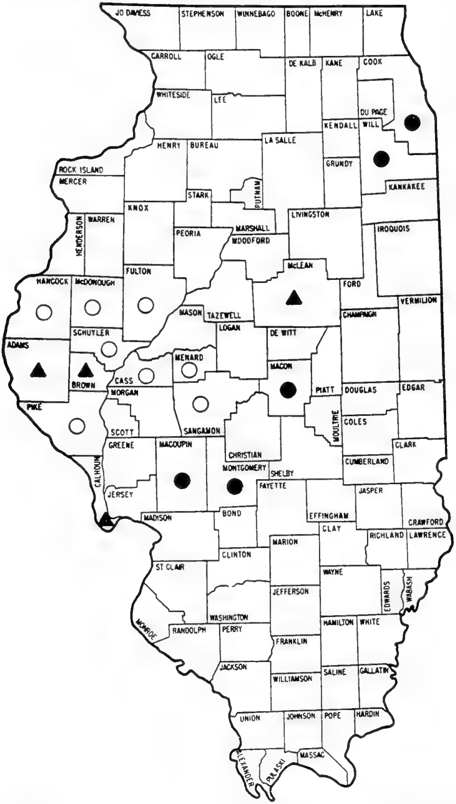

Figure 1. Illinois county records and status of Liatris scariosa var. nieuwlandii. Closed circle = known extant, open circle = presumed extirpated, closed triangle = status unknown.

During pre-settlement times, the irregular topography of such habitats may have ameliorated fire intensities and frequencies, allowing development of savanna vegetation (Bray 1955).

In the Chicago region, L. scariosa populations are confined to remnant savannas on the Tinley and Valparaiso morainic systems, and appear restricted to forest-prairie transition soils of the Morley-Markham-Ashkum silt loam (USDA 1979) soil catena. Typically, these savanna communities have been disturbed from past over grazing, and are often associated with railroad rights-of-way. Quercus macrocarpa is the characteristic overstory tree, forming a partial canopy in association with Carya ovata and Quercus alba. Other dominant woody plants include Cornus racemosa, Rhus glabra, and Vitis riparia. Common grasses include Andropogon gerardii, Sorghastrum nutans, and the Eurasian Poa compressa and P. pratensis.

Forty-one herbaceous species were recorded in association with Liatris scariosa var. nieuwlandii from six Chicago region stations (Appendix II). The most frequent associates included Allium cernuum, Anemone virginiana, Aster ericoides, A. laevis, A. sagittifolius var. drummondii, Fragaria virginiana, Helianthus divaricatus, Polygonatum canaliculatum, Silphium terebinthinaceum, Smilacina racemosa, Solidago rigida, and Zizia aurea. Also, many additional associates that may have been distinctive species of original savanna (Packard 1988) include Arenaria lateriflora, Lathyrus venosus var. intonsus, Polygala senega, Taenidia integerrima, and Thaspium trifoliatum var. flavum.

In central Illinois, Liatris scariosa populations were usually found in

railroad or cemetery savannas situated on transitional habitat between level and dissected till plains. The Macon Co. station is adjacent to the Shelbyville Moraine, at the southern limit of Wisconsinan glaciation (Willman and Frye 1970). The Macoupin Co. and Montgomery Co. stations are south of Wisconsinan glaciation. However, they occur on Wisconsinan-aged loess, which is deposited over the Vandalia ground moraine (Lineback 1979). These habitats are well-drained uplands at the edges of wooded ravines and consist of Sicily silt loam (a transitional soil formed under savanna vegetation) and other related soils (USDA 1969). Overstories of these central Illinois savanna communities are characterized by Quercus macrocarpa, Q. imbricaria, Q. velutina, and Q. stellata. Liatris scariosa appears restricted to microhabitats formed by partial overstory shade from these trees. Important associates include Andropogon gerardii, Andropogon scoparius, Ceanothus americanus, Coreopsis tripteris, Echinacea purpurea, Euphorbia corollata, Helianthus divaricatus, Silphium integrifolium, S. terebinthinaceum, Solidago nemoralis, S. speciosa, Sorghastrum nutans, and Veronicastrum virginicum.

It appears that in the past, Liatris scariosa var. nieuwlandii may have been more widely distributed in west-central Illinois (Figure 1), especially in the Western Forest Prairie Border Natural Division (Schwegman et al. 1973). Topography in this region is highly dissected, and savanna or barrens presumably were common. Mead (1846), who worked principally in Hancock Co., IL, distinguished Liatris aspera Michx. as a prairie species and L. scariosa (L.) Willd. as a barrens species. Typical soils in this natural division are developed in Wisconsinan-aged loess over Illinoian or older glacial till (Lineback 1979). Although plants still may occur in Calhoun, Adams, and Brown counties, all collections are prior to 1970 (Appendix II), and no

specific information is available on the condition or ecology of these stations.

Status

Liatris scariosa was recommended as a State of Illinois threatened species (Bowles 1987). The species has a history of decline, with a 65% reduction in extant county records, and probably a similar or even more severe populaton decline. Eleven populations now are known from five counties, and only three of these are within managed and protected sites (Table 1).

Although our estimates of population sizes included only counts of flowering individuals, the Illinois populations of Liatris scariosa var. nieuwlandii appear relatively small (Table 1), with individual plants usually infrequent within communities. Population sizes appear to be limited by the sizes of specific savanna micro-habitats, especially in central Illinois. Most populations appear threatened by competition for light and other resources as a result of succession toward total woody vegetation; it is likely this blazing star will decline further without prescribed burning of its savanna community.

In the Chicago region, the largest population (in Cook Co.) consists of fewer than 150 plants; another Cook Co. population was essentially destroyed by construction activities in December, 1987. Single Cook Co. and Will Co. sites containing this species have been managed by prescribed burning since 1987.

Other Illinois populations are very small and appear vulnerable even to

minimal disturbances. One plant was found in an unmanaged Macon Co. railroad right-of-way. The Macoupin Co. populations consisted of 10 flowering plants in a cemetery savanna, and of 2 flowering plants in a railroad prairie and savanna, which was disturbed by public utility line construction in 1988. In Montgomery Co., a single flowering plant was found in a publicly owned but unmanaged prairie/savanna threatened by invasion and competition from exotic vegetation. A second Montgomery Co. population consisted of 25 flowering plants in a fire-managed cemetery savanna nature preserve. Populations may exist at Siloam Springs State Park (Adams Co. and Brown Co). and in Calhoun Co.. but their status is unknown. One 1978 McLean Co. collection is from a mesic prairie nature preserve, where a population could remain extant.

SUMMARY

Our studies indicate that in Illinois, populations of Liatris scariosa var. nieuwlandii constitute a valid taxon. In the past, this plant may have suffered great loss of habitat and populations, especially during the rapid loss of savanna that occurred in Illinois during the decade after settlement (Engelmann 1863). This decline continues, and L. scariosa currently is threatened with extirpation from the state. Proper protection and community management by the re-introduction of burning appear essential for the survival of many smaller populations and the proper maintenance of all savanna communities containing this blazing-star.

Little specific information is available on the total distribution and status of Liatris scariosa var. nieuwlandii beyond Illinois. This plant extends eastward through Indiana, Michigan, Ohio, West Virginia, Pennsylvania, New

York and Ontario (Shinners 1943, Cronquist 1980). Its western distribution extends to Missouri and Nebraska (from where we have observed specimens), and Arkansas (Shinners 1943). The status of this blazing-star in these states may be comparable to that of Illinois if similar habitat decline has occurred.

ACKNOWLEDGMENTS

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Appendix I. Historic county voucher specimens, site records, or references for Liatris scariosa var. nieuwlandii. Herbarium abbreviations: F (Field Museum), ILL (University of Illinois), ILLS (Illinois Natural History Survey), ISM (Illinois State Museum), MOR (the Morton Arboretum), SIU (Southern Illinois University).

COUNTY	COLLECTOR, NUMBER, DATE, LOCALITY, DEPOSITORY
Adams	Evers, #70989, 1961, Siloam Springs St. Pk., ILLS
Adams	Rexroat, #9587, 1964, E part of County, ISM
Brown	Evers, #101312, 1969, Siloam Springs St. Pk., ILLS
Calhoun	Campbell & Alexopoulos, s.n. 1930, Ringhauser Orchard, ILLS
Calhoun	Evers, #92917, 1967, Perrens Ledge, Kampsville, ILLS
Cass	Rexroat, #641, 1953, ISM
Cook	Bray, s.n., 1892, Burnside-by Railroad, F
Cook	Umbach, s.n., 1909, Palos Pk, F
Cook	Bartel, s.n., 1956, Palos Pk-1/2 mi SW 95th & Rt 45, F
Cook	Lace, s.n., 1972, Palos Hts-141st & Harlem, MOR
Cook	Pearsall, #8332, 1973, Orland (Pk?), ISM, ILLS
Cook	Mule, s.n., 1987, MOR, Orland Pk-McGinnis F.P., MOR
Cook	Mule & Bowles, pers. obs., 1987, Orland Pk-RRROW
Cook	Packard, s.n., 1985, Oak Forest F.P., MOR
Cook	Bowles, #705-6, 1987, Oak Forest F.P., MOR
Cook	Packard, s.n., 1985, Midlothian F.P., MOR
Cook	Bowles, #709, 1987, Midlothian F.P., MOR
Cook	Packard, pers. obs., 1987, Cap Sauers Holdings N.P.
Fulton	Winterringer, #5182, 1950, Avon-RRROW, ISM
Hancock	Mead (1846)[1]
Macon	Shildneck, #C-4507, 1972, W Decatur-RRROW, ISM
Macoupin	Robertson, s.n., 1880, Carlinville, ILLS
Macoupin	White, #309, 1968, Carlinville-RRROW, SIU
Macoupin	Koelling, #4245, 1971,2 mi S Plainview-RRROW, ISM
Macoupin	Bowles, #710, 1987 Plainview-Cemetery Savanna, MOR
McDonough	Myers, #1187, 1950, roadside near Colmar, ISM
McLean	Shildneck, #C-10136, 1978, Weston Cemetery N.P., MOR
Menard	Hall, s.n., 1861, dry woods and sandy hills, F
Menard	Rexroat, #5312, 1958, S of Oakford, ISM
Montgomery	Schwegman, s.n., 1970, E of Lake Lou Yaeger dam, SIU
Montgomery	Bowles, #694, 1987, Lake Lou Yaeger dam, MOR
Montgomery	Bowles, #695, 1987, Roberts Cemetery Savanna N.P., MOR
Pike	Campbell and Alexopoulos, s.n., 1930, near Nebo, ILLS
Pike	Boewe, s.n., 1938, in Pittsfield, ILLS
Sangamon	Winterringer, #2258, 1949, Rt 54 RRROW NE Springfield, ISM
Sangamon	Rexroat, #6401, 1959, NW Springfield, ISM
Schuyler	Rexroat, #10714, 1968, red clay open hill, ISM
Will	Packard, pers. comm., 1985, Hunters Woods F.P.
Will	DeMauro, s.n., 1987, Hickory Creek F.P., MOR

[1] Mead, S.B. 1846. Catalogue of plants growing spontaneously in the State of Illinois, the pricipal part near Augusta, Hancock County. The Prairie Farmer 6:35-36, 60, 93, 119-122.

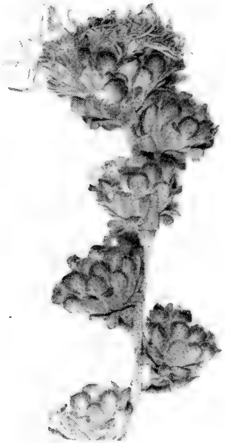
Appendix II. Occurrences of plant species associated within one meter of Liatris scariosa var. nieuwlandii in six Chicago region (Cook Co. and Will Co., IL). * = species listed as savanna or barrens species by Mead (1846). Nomenclature follows Swink, F. and G. Wilhelm. 1979. Plants of the Chicago Region. The Morton Arboretum, Lisle, IL.

PLANT SPECIES	1	2	3	4	5	6	Total
WOODY PLANTS							
Carya ovata			x				1
Cornus racemosa	x			x	x		4
Corylus americana*						X	
Crataegus sp					x		1
Euonymus atropurpureus		x					1
Fraxinus sp		x					1
Lonicera tatarica(?)		x					1
Pyrus ioensis						X	1
Quercus alba						X	1
Quercus ellipsoidalis			x			x	2
Quercus macrocarpa	x	x	x	x	x		5
Quercus rubra		x	x	x			3
Rhus glabra*		x		x		x	3
Rosa blanda	x						1
Rosa carolina						X	1
Rubus sp			x				1
Salix humilis					x		1
Viburnum lentago						X	1
Vitis riparia	x	x			x		3
GRASSES AND SEDGES							
Andropogon gerardii						x	1
Carex pensylvanica				x			
Danthonia spicata			x				1
Hystrix patula	x						1
Panicum implicatum				X			1
Poa compressa	x						1
Poa pratensis	x						1
Sorghastrum nutans			x			x	2
FORBS							
Agrimonia gryposepala						X	1
Allium canadense	x						1
Allium cernuum	X				x	X	3
Anemone virginiana	x	x			x	x	4
Antennaria plantaginifolia				x			1
Apocynum androsaemifolium	x						1
Arenaria lateriflora*		x					1
Aster ericoides	x		x		x		3
Aster laevis	x			x	x		3

Aster sagittifolius var. drummondii	x	x			x		3
Coreopsis tripteris*					x		1
Desmodium canadense	x					x	2
Desmodium cuspidatum			x				1
Desmodium paniculatum*				x			1
Eryngium yuccifolium			x				1
Eupatorium rugosum	x						1
Euphorbia corollata	x					2	2
Fragaria virginiana	x	x				x	3
Helianthus divaricatus	x			x		x	3
Lathyrus venosus	x						1
Parthenium integrifolium			x				1
Potentilla simplex			x	x			2
Polygala sanguinea			x				1
Polygala senega*	x					x	2
Polygonatum canaliculatum	x	x				x	3
Prenanthes alba*			x	x			2
Pycnanthemum tenuifolium			x				1
Ratibida pinnata	x				x		2
Rudbeckia hirta	x				x		2
Silphium integrifolium*	x				x		2
Silphium terebinthinaceum*	x		x	x	x	x	5
Smilacina racemosa	x				x	x	3
Smilax lasioneura	x					x	2
Smilax tamnoides var. hispida						x	1
Solidago altissima					x		1
Solidago juncea*	x	x					2
Solidago nemoralis			x		x		2
Solidago rigida				x	x		2
Solidago ulmifolia*	x			x			2
Taenidia integerrima*	x						1
Thaspium trifoliatum var. flavum	x					x	2
Vicia americana	x					x	2
Viola sagittata*			x				1
Zizia aurea	x				x	x	3

Photographs

Liatris scariosa var. nieuwlandii
M. L. Bowles #694, 31 August 1987, Montgomery Co., IL
Morton Arboretum Herbarium



Top Photograph:

Liatris scariosa var. *nieuwlandii*
P. Shildneck # C-10136, 25 August 1978, McLean Co., IL
Morton Arboretum Herbarium

Bottom Photograph:

Liatris scariosa var. *nieuwlandii*
P. Shildneck # C-4507, 2 September 1972, Macon Co., IL
Morton Arboretum Herbarium

Photographs:

Liatris ligulistylis
C. J. Sheviak # 2323, 5 August 1982, Ward Co., ND
New York State Museum Herbarium

Photographs:

Liatris aspera
U. Rowlatt. #1013, 5 October 1980, Cook Co.
Morton Arboretum Herbarium

CLINTONIA--AN UNUSUAL STORY

Most of the additions to the flora of Illinois involve introduced species. It is not common when a native plant is added as new to Illinois at this late date.

However, this is the case with the Bluebead Lily, *Clintonia borealis*. Jerry Wilhelm, in rummaging around the Field Museum herbarium in Chicago, came across a specimen of Clintonia collected at Maplewood, Illinois, by Mr. C. W. Duesner, in 1908.

I checked with the Chicago Historical Society and found that Maplewood is now part of Chicago. Sally McGill, a librarian at the Society, gave me a copy of a page from a history of Cook County, which shows that it originally comprised the southeastern quarter of Section 25, bounded on the east by Western Avenue and on the south by Fullerton Avenue.

I then checked with my copy of the 1944 Official Guide to the Railways (not many people keep these!) and found that Maplewood was a stop on the Chicago & Northwestern Railroad, although so little used that it was not shown in any of the time tables. I then telephoned the railroad, and they informed me that the depot was a block or so south of Diversey Avenue at Maplewood Avenue (which would place it three short blocks west of Western Avenue).

Undoubtedly Mr. Duesner found a swampy wooded area along the nearby Chicago River in those early days--our guess being that it was a Red Maple forest. As late as the 1940's, I knew of such a Red Maple swamp in Morton Grove, on the northwest corner of Dempster Street and Austin Avenue. I remember it well because it contained a large colony of Black-Crowned Night Herons.

For those interested, vouchering of this specimen is available at the Field Museum, and also at the Morton Arboretum.

Floyd Swink

NEW DISTRIBUTION RECORDS FOR THE VASCULAR FLORA OF NORTHERN ILLINOIS

Erwin F. Evert

ABSTRACT

Tussilago farfara is reported new for the state, and 28 new county records involving 25 species are reported. Notes concerning the occurrence of 9 Illinois endangered and threatened species are also presented.

INTRODUCTION

During the last several years while engaged in various floristic studies in northern Illinois, I have collected a number of species which represent new distributional data. One species, Tussilago farfara, was unrecorded for the state, and 25 taxa apparently represent new Illinois county records. In addition, a number of previously unreported populations of Illinois endangered and threatened species have been observed, or extant populations of these species have been verified as occurring at former historical stations. It is the purpose of this paper to present these new distributional data.

Voucher specimens of all taxa listed below are deposited at the Morton Arboretum Herbarium (MOR). Taxa in each section are listed in alphabetical order by genus and are followed by county, location within county, habitat, collection date, collector, collector's number, and notes (omitted in section II) pertaining to occurrence and/or significance. Taxa not native to Illinois are preceded by an asterisk. Nomenclature follows Mohlenbrock (1986).

I. SPECIES NEW TO ILLINOIS

*Tussilago farfara L. Lake Co., T43N R12E SE 1/4 S3, Lake Forest just n. of Ft. Sheridan, disturbed, unstable clay on n. facing slope near ravine bottom with Prunus virginiana, Smilacina

racemosa, and Solanum dulcamara, 11 May and 3 June 1982, Evert 3701, 3797. A native of Eurasia, Tussilago farfara is an early blooming (March-June) scapose, perennial composite. The flowering scapes bearing yellow radiate and discoid heads appear several weeks before the appearance of the eventually large basal leaves. Tussilago farfara is found naturalized occasionally in disturbed places, frequently on clay banks, throughout the northeastern U.S. as far west as Minnesota (Fernald, 1950). Thus far, this conspicuous species has been reported in the Chicago region only from Berrien County, Michigan, where it occurs on sandbars (Swink & Wilhelm, 1979). The apparently spontaneous colony of Tussilago farfara from Lake County, Illinois, covers an area of about 30 x 15 ft. in a disturbed portion of an otherwise undisturbed ravine.

II. NEW COUNTY RECORDS

Aralia nudicaulis L. Will Co., T34N R14E SW ¼ S26, mesic, wooded ravine, 27 May 1984, Evert 6469.

Asplenium platyneuron (L.) Oakes. Rock Island Co., T18N R1E SE ¼ S8, Illiniwek Forest Preserve, wooded ravine, 20 Sept 1980, Evert, 2508.

Athyrium thelypterioides (Michx.) Desv. Henry Co., T18N R2E SE ¼ S24, wooded, mesic ravine, 20 Sept 1980, Evert 2504.

Botrychium dissectum Spreng. var. obliquum (Muhl.) Clute. Rock Island Co., T18N R1E SE ¼ S8, Illiniwek Forest Preserve, wooded ravine, 20 Sept 1980, Evert 2511.

Cystopteris bulbifera (L.) Bernh. Bureau Co., T15N R9E NW ¼ S36, wooded seepage in ravine bottom, 21 Sept 1980, Evert 2515. Lake Co., T45N R12E NE ¼ S9, Waukegan, seepage bank in wooded ravine, 19 May 1982, Evert 3737.

Cystopteris X tenuis (Michx.) Desv. Lake Co., T43N R13W NW ¼ S31, Highland Park, wooded ravine bottom on limestone boulders, 3 June 1982, Evert 3796. McHenry Co., T43N R8E S33, Algonquin, sandstone railroad bridge, 13 June 1983, Evert 5201.

Dryopteris carthusiana (Villars) H. P. Fuchs. Rock Island Co., T18N R1E SE ¼ S8, Illiniwek Forest Preserve, wooded ravine, 20 Sept 1980, Evert 2510.

Dryopteris goldiana (Hook.) Gray. Lake County, T43N R12E NW ¼ S3,

Lake Forest, wooded ravine bottom, 13 June 1980, Evert 1875.

Dryopteris intermedia (Muhl.) Gray. Will Co., T34N R14E SW ¼ S26, wooded, mesic ravine, 13 April 1984, Evert 6456.

*Euonymus europaeus L. Cook Co., T41N R12E SW ¼ S9, Carle Woods Forest Preserve, forest edge, 16 May 1981 and 19 Aug 1981, Evert 2579a, 2579b.

Filipendula rubra (Hill) Robins. McHenry Co., T45N R6E S5, wet prairie, 8 May 1987, Evert & Vanderpoel 11834.

*Lonicera xylosteum L. Lake Co., T43N R12E NW ¼ S25, Highland Park, wooded ravine, 22 May 1981, Evert 2583.

Lycopodium lucidulum Michx. Rock Island Co., T17N R4W S34, Loud Thunder Forest Preserve, wooded ravine, 26 Nov 1982, Evert 5134. Will Co., T34N R14E SW ¼ S26, wooded, mesic ravine, 27 May 1984, Evert 6467.

Milium effusum L. Cook Co., T41N R12E SW ¼ S9, Carle Woods Forest Preserve, mesic woods, 2 June 1980, Evert 1791 and 5 June 1981, Evert 2650.

Mitchella repens L. Will Co., T34N R14E SW ¼ S26, oak woods, 13 April 1984, Evert 6454.

Osmunda cinnamomea L. Kane Co., T42N R7E NW ¼ S16, Rutland Bog, 8 May 1982, Evert 3683.

Phegopteris hexagonoptera (Michx) Fee. Lake Co., T43N R13E NW ¼ S31, Highland Park, wooded ravine, 18 Nov 1981, Evert 3636.

*Poa bulbosa L. Cook Co., T41N R13E SW ¼ S30, Niles, along forest path, 31 May 1983, Evert 5178.

Polystichum acrostichoides (Michx.) Schott. Rock Island Co., T18N R1E SE ¼ S8, Illiniwek Forest Preserve, wooded ravine, 20 Sept 1980, Evert 2509.

Pyrola elliptica Nutt. Will Co., T34N R14E SW ¼ S26, oak woods on ravine crest, 13 April 1984, Evert 6455.

*Rhodotypos scandens (Thunb.) Makino. Cook Co., T41N R13E NE ¼ S9, St. Paul Woods Forest Preserve, oak forest, 19 May 1983, Evert 5143.

Rubus pubescens Raf. Kane Co., T41N R8E NE ¼ S1, Trout Park Nature Preserve, arbor vitae fen, 7 May 1982, Evert 3645.

Spiranthes ovalis Lindl. Rock Island Co., T17N R4W S34, Loud Thunder Forest Preserve, pine plantation, 26 Nov 1982, Evert 5135.

Trillium nivale Riddell. Bureau Co., T16N R9E S36, oak-maple woods, 4 April 1987, Evert 11811.

Viola conspersa Reichenb. DuPage Co., Timber Ridge Forest Preserve, oak woods, 1 May 1980, Lampa s.n.

III. NOTES ON THE OCCURRENCE OF SOME ILLINOIS ENDANGERED AND THREATENED SPECIES

Carex woodii Dewey. Cook Co., T41N R11E NE ¼ S20, Busse Woods Forest Preserve, along s. edge of marsh in old growth forest of Acer saccharum and Quercus rubra, 5 May 1980, Evert 1674. Listed as endangered in Illinois, Carex woodii was previously known from single collections in Cook, Kankakee, Will, and Winnebago Counties (Sheviak, 1981). Carex woodii was previously last collected (Chase 9489 ILL) in Cook County at Elk Grove on 28 May 1948. It is significant, therefore, that a few individuals of this rare, early flowering sedge were verified as extant in the same general area of the original Cook County collection. A deligent search for this species would probably uncover additional populations since much apparently suitable habitat (mesic woods) for this species exists in northern Illinois.

Chamaedaphne calyculata (L.) Moench. Cook Co., T36N R14E NE ¼ S35, Zanders Woods Nature Preserve, several plants in a wet sandy depression with Osmunda regalis, Vaccinium macrocarpon, Quercus palustris, and Sphagnum sp., 17 Nov 1983, Evert 6451. An Illinois threatened species, Chamaedaphne calyculata is restricted in Illinois to a few bogs and swamps in Lake and McHenry Counties, to a bog in Kane County, and to a sandy swamp near Thornton in Cook County (Sheviak, 1981). Chamaedaphne calyculata was collected (Pearsall 7305, ISM) in Cook County near Thornton in 1941. The shrub was also observed near Thornton in a Department of Conservation inventory in the 1970's (Endangered species files of the Natural Land Institute, Rockford). My discovery in 1983 near Thornton of about 40 stems of Chamaedaphne calyculata covering a small area of about 3 x 10 ft. is, therefore, noteworthy in that it corroborates the presence of at least one extant population, however precarious, in Cook County. The precarious nature of this species' tenure in

Cook County was apparent when I revisited this population, just south of Thornton-Lansing Road, on 28 March 1987 and found the colony to have decreased in size; only 3 x 6 ft. was occupied by about 20 stems, and only 3 stems retained a few leaves. All stems of this evergreen shrub were browsed by herbivores (probably deer), and about 15 of the remaining 20 stems had recently died. The site also appeared to have been recently partially burned.

Gaultheria procumbens L. Cook Co., T35N R14E SE ¼ S2, Jurgenson Woods Nature Preserve ca. 300-400 ft. west of Hwy 394, several small patches on sandy soil in wet woods dominated by Quercus palustris with a ground layer of Vaccinium angustifolium and Maianthemum canadense with some Mitchella repens, 17 Nov 1983, Evert 6448. This Cook County collection of Gaultheria procumbens apparently represents the only known extant population in Illinois of this diminutive shrub. Gaultheria procumbens, an endangered species in Illinois has also been reported from Lake, LaSalle, and Ogle Counties where no extant populations are presently known (Sheviak, 1981). This species was also collected (J. T. Stewart s. n., F) in Peoria County probably before the turn of the century. Gaultheria procumbens has been collected several times in Cook County at Niles, Glencoe, and Elk Grove (Higley and Raddin, 1891; Jones, 1950); the Elk Grove collection (Pearsall 8334, ISM) in 1943 was apparently the last in Illinois until the one reported above.

Milium effusum L. (See above: New County Records) was previously known in Illinois from only two nineteenth century collections from Kane and Tazewell Counties (Mohlenbrock, 1972) and was apparently presumed extinct in Illinois since it was not listed as an endangered or threatened species by Sheviak (1981). The collections reported from Carle Woods in Cook County represent the only known extant population of Milium effusum in the state. A conspicuous and visually striking species of rich moist woods of northeastern North America, Milium effusum is at the southwestern periphery of its range in northern Illinois. This rare grass has been growing in Carle Woods apparently unknown to botanists in Illinois for over forty years. Reeder (1940) in his study of Carle Woods reported Milium effusum to be frequent throughout. It seems, however, that this species has greatly declined here in abundance over the last forty years. The population of Milium effusum in Carle Woods when last observed in June 1985 was comprised of only about 30 individuals growing under old growth Acer saccharum and Quercus rubra in moist sandy soil in a few areas free of ground layer competition.

Polygonatum pubescens (Willd.) Pursh. Cook Co., T41N R12E SW ¼ S9, Carle Woods Forest Preserve, mesic, maple-oak woods, 4 June 1982, Evert 3828; T41N R13E NE ¼ S19, St. Paul Woods Forest Preserve, oak woods on clay bank along east side N. Br. Chicago River, 19 May 1983, Evert 5145; T41N R13E NE ¼ S31, Clayton F. Smith Forest Preserve, wet woods of Quercus palustris and Acer rubrum, 20 May 1983, Evert 5154; T40N R13E NE ¼ S5, Chicago, along N. Br. Chicago River s. of Devon Ave. in remnant oak woods with Hamamelis virginiana, 20 May 1983, Evert 5157; T41N R13E NE ¼ S8, Harms Woods Forest Preserve, clay banks above N. Br. Chicago River under Acer saccharum, Hamamelis virginiana, and Quercus rubra, 2 June 1983, Evert 5190. Polygonatum pubescens is restricted in Illinois to 8 northern counties(Sheviak, 1981). The majority of collections of this species in Illinois have been early ones (before 1915) as cited by Jones and Fuller (1955). Urban development has eliminated much of this species' habitat particularly in Cook County where it was reported by Higley and Raddin (1891) as frequent in open woods and shaded banks. The most recent previous collection (Gates 468, F) from Cook County of Polygonatum pubescens, that I have been able to find, was made in 1905. My collections, all from Cook County representing extant populations of this Illinois endangered species, are, therefore, of interest. Most of these populations are small, consisting of less than 25 or 30 individuals; however, the largest, in the city of Chicago along a busy thoroughfare, consists of at least 300 individuals.

Rubus pubescens Raf. Cook Co.: T41N R12E SW ¼ S9, Carle Woods Forest Preserve, wet soil with Quercus bicolor, Rhamnus frangula and Onoclea sensibilis, 7 May 1980 and 9 May 1982, Evert 1676a, 3689; T41N R11E NW ¼ S21, Busse Woods Forest Preserve, swamp forest of Quercus bicolor and Fraxinus nigra with Thelypteris palustris, and Viola pallens, 6 June 1980, Evert 1811; T41N R13E SW ¼ S9, Harms Woods Forest Preserve, flat, wet woods of Quercus palustris and Acer rubrum, 2 June 1983, Evert 5186. Lake Co., T44N R9E NE ¼ S36, Wauconda Bog Nature Preserve, wet soil with Larix laricina, Maianthemum canadense, and Rhamnus frangula, 10 June 1980, Evert 1856. Rubus pubescens is an infrequently collected species in Illinois. Reported from 4 northern counties, from east central Vermilion County (Mohlenbrock & Ladd, 1978) and DuPage County (Mohlenbrock, 1985), Rubus pubescens is known in Illinois from only a few primarily early collections. Apparently this species has not been collected in Cook County since the nineteenth century, and Sheviak (1981) reports only a single known population in Illinois from Lake County. Thus, the recent collection of Rubus pubescens cited above from Cook and Lake

Counties representing three new stations for this species and the verification of an old one (Wauconda Bog) are noteworthy. Rubus pubescens is and has been found primarily on wet soils in bogs and swamps in Illinois. However, this species was reported by Higley and Raddin (1891) to occur in dry woods and sandy knolls, a habitat alternative corroborated by Voss (1985). As mentioned previously, Rubus pubescens has been attributed to 5 northern Illinois counties. The attribution of this species to DeKalb County by Jones & Fuller (1955) and many others since is probably in error due to, originally, a printing error (a misplaced circle on the map in Jones & Fuller, 1955). No collections of R. pubescens from DeKalb County could be found in Illinois herbaria. However, R. pubescens was reported to occur in Kane County by Patterson (1876), and a collection (Brendel s.n., ILL) from Elgin does exist. Therefore, it seems that this species should be correctly attributed to adjacent Kane County where indeed R. pubescens can still be found. See above New County Records.

Vaccinium macrocarpon Ait. Cook Co., T36N R14E NE ¼ S35, one small colony in a sandy depression in Zanders Woods Nature Preserve growing with Chamaedaphne calyculata, Osmunda regalis, Quercus palustris, and Sphagnum sp., 17 Nov 1983 and 28 March 1987, Evert 6450 and 11807. Vaccinium macrocarpon has not been collected in Cook County since 1946, when Fuller found this species near Maple Lake (Fuller 12333, F, ILL). This species was also collected (Schneider 1151 & 1226, F, ILL, ILLS) in Will County near Braidwood in 1939. Sheviak (1981) reports that both of these populations have been destroyed. V. macrocarpon was also reported from the Thornton area in Cook County by Patterson (1876). All other previously known populations of V. macrocarpon in Illinois are from a few bogs in Lake and McHenry Counties (Sheviak, 1981). The small colony of V. macrocarpon growing in Zanders Woods near Thornton in a small area of about 4 x 10 ft. and consisting of about 100 stems in Nov 1983 is, therefore, of interest. Apparently thriving then, this population of V. macrocarpon like that of Chamaedaphne calyculata with which it grows seems to have been adversely affected over the last several years (only about 30 desiccated stems of the cranberry were observed in March 1987) by perhaps low water levels, lack of snow cover, fire, and herbivores.

Viola conspersa Reichenb. Cook Co.: T41N R13E NE ¼ S31, forest preserve just sw. of the junction of Touhy Ave. and Caldwell Ave., a large population of over 100 individuals in wet woods with Quercus palustris, Acer rubrum, Maianthemum canadense, and Viola

incognita, 23 April 1981, Evert 2572; T41N R13E NE ¼ S19, St Paul Woods Forest Preserve, a few plants on a clay bank above N. Br. Chicago River with Quercus rubra, Acer saccharum, and Polygonatum pubescens, 19 May 1983, Evert 5153. DuPage Co., see above New County Records. Lake Co., T44N R11E SE ¼ S34, MacArthur Woods Forest Preserve, a few plants in wet woods of Quercus bicolor, 25 May 1983, Evert 5168. Sheviak (1981) reports only six known Illinois populations of Viola conspersa from Cook, Lake, and DeKalb Counties. V. conspersa has also been reported from Richland County (Mohlenbrock & Ladd, 1978). The most recent previous collections of the apparently largest naturally occurring populations in Illinois have been from Lake County where Moran (1978) reports V. conspersa as common along ravine crests. The collection from DeKalb County apparently represents an introduction (Sorensen, 1984). Viola conspersa was observed during a Department of Conservation inventory in the 1970's in extreme northern Cook County (Endangered species files of the Natural Land Institute, Rockford). However, all of the Cook County collections of V. conspersa, that I am aware of, have been early ones made before 1912. The two collections from Cook County and the ones from DuPage and Lake Counties of V. conspersa reported here as new stations for this species in these counties are, therefore, of interest.

Viola incognita Brainerd. Location and habitat the same as the first Cook County collection of Viola conspersa cited above, 23 April 1981, Evert 2573. Sheviak (1981) states that no known extant populations of Viola incognita are known from Illinois. This species has been reported from Cook, Jo Daviess, and McHenry Counties (Mohlenbrock & Ladd, 1978) and from Kane County (Mohlenbrock, 1985). V. incognita, a stemless, white-flowered species with pubescent lateral petals and pubescent leaves, was last collected (Bross s.n., F) in Cook County, Chicago, in 1880. The recent collection reported above also from Cook County near Chicago is, therefore, noteworthy. Only a few plants occur at this site, but additional habitat occurs in the vicinity, and a larger population of V. incognita may be present in Cook County.

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BIOGRAPHICAL SKETCH

Erwin F. Evert is a former biology teacher, now an active field botanist and research associate at the Morton Arboretum. In addition to his interest in collecting and growing Illinois native plants, he is especially interested in the floristics of the Yellowstone region where he has discovered and described a number of new species.

ILLINOIS' "NATIVE" MOCK ORANGE

John E. Schwegman[1]

On June 7, 1919, a young botanist from Missouri was collecting plants from a newly constructed railroad trackway that parallels the Ohio River shore north of Golconda, Illinois. As he proceeded up the tracks, he noted a large population of beautiful flowering shrubs. The sight of mock orange (Philadelphus) shrubs growing in the Illinois forest must have been as exciting as it was unexpected. As Ernest Jesse Palmer collected specimens from the plants, he could scarcely have imagined the long chain of events regarding its identity, later discovery and eventual extinction that were to follow.

When Palmer's collections reached his sponsor, the Arnold Arboretum, it was suspected that the mock orange was an escape from cultivation as it did not fit the description of any recognized native species (Rehder, 1921). Palmer had labeled his first specimens P. coronarius (a European species) but at the request of Dr. Rehder, he returned in October 1920 to collect additional material.

Based on these two collections, Rehder (1921) declared the plants to be P. verrucosus a species described by Schrader in 1828 from cultivated plants in Germany. Although Schrader believed it was a North American native, botanists here knew of no wild populations of it. American botanists considered P. verrucosus a garden form or possibly a hybrid between P. pubescens and P. coronarius. However, Rehder concluded that P. verrucosus was a rare native species and that the Pope County population represented its only known wild population. He predicted that additional populations would be found, probably in Kentucky and Tennessee.

In subsequent years, no other "wild" populations of P. verrucosus turned up and indeed for 48 years after a final visit by Palmer in September, 1923, no botanist was able to relocate the population he had found. Several botanists had searched in vain for the elusive Philadelphus in the 1950's and 1960's. I had searched the bluffs with binoculars myself on several occasions during the late 1960's. In the spring of 1971, I decided to make a special effort to relocate the plants.

Preparations for the search were hampered because Palmer's original description of his expedition (Palmer, 1921) was not available at the Southern Illinois University Library and none of his specimens

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were available in Illinois herbaria. I felt these materials might hold additional clues to the location. At the time, I was unaware that a complete set of Palmer's collections were at The Missouri Botanical Garden.

I began preparations by visiting populations and collecting material of P. pubescens on the Cumberland River Bluffs in nearby western Kentucky. Mr. Raymond Athey of Paducah, Kentucky led me to populations he knew on limestone river bluffs near Dycusburg in Crittenden County and on sandstone blufftops one mile east of Smithland in Livingston County. The latter plants were growing with Vaccinium arboreum and were only 16 miles south of Golconda. Feeling familiar with the plant and its habitat, I was ready for the search.

As it happened, I had to attend a meeting at the Morton Arboretum at about this time. Taking advantage of their fine botanical library, I looked up Palmer's report on southern Illinois plants and was disappointed to see only "rocky talus below high bluffs of the Ohio River near Golconda". This is the description copied in numerous manuals and offered nothing new. But as I read Rehder's description of P. verrucosus which happens to follow Palmer's paper in the Journal, I was amazed to see published as an addendum to his paper a letter from Palmer. Intended as evidence from the collector that the plants were wild and not a cultivated escape, Palmer gives details of their location. He reports 10 or 12 clumps of the shrub at the base of a bluff with east or northeast exposure three or four miles from Golconda. He mentions the railroad and gives the impression that the plants were dis- covered from it. As a final observation, he notes that they were growing 30 to 40 feet above the Ohio River.

I was struck by the elevation notation. Thirty to forty feet above the river would be high river banks on the Ohio and would be on the river side of the railroad tracks not the bluff side where everyone had been looking!

On May 22, 1971, I searched north from Golconda watching the river banks and rediscovered the lost Philadelphus. Two clumps of the shrub were found on the east side of the railroad tracks 1¼ miles north of Golconda. The exact location was 900 feet south of the Giddeonson Hollow trestle.

While Palmer had noted 10 or 12 clumps and estimated their distance at 3 or 4 miles from town, I felt certain that these plants were the pupulation he knew. Palmer lacked topographic maps as an aid to determining his location and his estimate of 3 or 4 miles indicates he was unsure. If one were 3 or 4 miles north of Golconda, the bluff exposure would be southeast, not east to northeast as he

described. In addition, my plants matched his collections which I later checked at the Missouri Botanical Garden, and were definitely different from typical P. pubescens from western Kentucky.

My first impression on seeing the plants was that they were not P. pubescens. Neither of the standard manuals for the northeastern United States follow Rehder (1921) in recognizing P. verrucosus. Fernald (1950) lumps it under P. pubescens and Gleason (1952) ignores it. The Pope County plants come down to a choice between P. pubescens and P. coronarius in both keys. They key directly to P. coronarius in Gleason (1952) which relies on twig color and exfoliation of bark from young branches as the key characters. Their brown to maroon branchlets with strongly exfoliating bark contrasts sharply with the light gray, tight bark of P. pubescens from western Kentucky. Fernald, on the other hand, places greater significance on leaf and calyx pubescence. Using his key the plants key weakly to P. pubescens on the basis of their hairy lower leaf surface but they lack the supposed Calyx pubescence.

Hu (1955) in his monograph on Philadelphus, follows Fernald in giving great weight to pubescence. He took what appears to be a glabrous form of P. pubescens and not only placed it in a separate species (P. intectus) but also in a different Series. He segregates and describes a new species (P. gattingeri) from P. pubescens on the basis of a pubescent style, disc and corolla base versus glabrous. He also creates a new variety verrucosus for P. pubescens. He separates the variety on leaf shape with it having elliptic leaves with acute to obtuse bases as opposed to ovate with rounded bases for the species. Hu has annotated the Palmer collections from Galconda housed at the Missouri Botanical Garden. He attributes some of these collections to each of his varities of P. pubescens. While Hu describes P. pubescens as having gray bark that does not exfoliate, the specimens he annotated have red-purple bark that is shredding on older stems. His identifications of the Pope County materials should be ignored.

Based upon material I have collected and that which I examined at the Missouri Botanical Garden, I feel that the twig color and bark characters are more constant and more significant than pubesecence. All of my Kentucky collections consistently have a tight smooth gray bark but exhibit great variation in pubescence. Typical collections have densely pubescent lower leaf surfaces and sparse to densely hairy outer sepal surfaces. However, one specimen has small leaves that are sparcely pubescent on lower leaf surfaces and glabrous on outer sepal surfaces and the hypanthium. This plant keys to P. pubescens var. intectus in Gleason (1952) but would best key to P. coronarius in Fernald (1950). Its slightly pubescent lower leaf surfaces would prevent it from fitting Hu's P. intectus. I feel this specimen is clearly part of P. pubescens based on its

branchlets with smooth gray bark and the fact that it was collected from a shrub within a large colony of typical P. pubescens.

While having the branchlet bark typical of P. coronarius, the Pope County plants consistently have lower leaf pubescence and occasionally have some pubescence on the hypanthium and outer sepal surfaces. This seems to clearly separate them from P. coronarius.

My conclusion is that the Pope County plants do not fall within the variation of P. pubescens. They are also not typical P. coronarius. I feel they are P. verrucosus as Rehder thought. Since P. verrucosus has not not appeared elsewhere in the wild as Rehder speculated it might, I feel it is a garden plant of hybrid origin. The Pope County plants are clearly intermediate between P. pubescens and P. coronarius which are the probable parent species. My specimens are deposited at the Illinois State Museum.

While the Pope County locality is remote, the arrival of P. verrucosus from a cultivated source is rather easily explained. The site's location near the river's high water mark is where one would expect plants washed out by upstream flooding to lodge.

On July 30, 1981, after an absence of 9 years, I returned to the Philadelphus site north of Golconda. When I could not immediately find the plants, I went up to the railroad trestle and measured back to the exact spot. A railroad car of rip rap rock had been dumped right where the plants had been and none of them had survived! Apparently, high water on the river had threatened to wash out the tracks at some time in the late 1970's and the rock was dumped to stabilize the erosion. The plant, whatever its identity, now appears to be extinct in the wild in Illinois.

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MACROLICHENS OF POUNDS HOLLOW

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INTRODUCTION

Lichens are classified broadly according to their general growth forms. One common convention is to divide them into two major groups: the crustose lichens and the macrolichens. Crustose forms are those which lack a lower cortex and cannot be removed intact from their substrate; in Illinois, about half the lichen flora consists of crustose species. Macrolichens, on the other hand, include the remaining forms, those described as foliose, fruticose, squamulose, umbilicate, and gelatinous.

Identification of the crustose species, sadly, is hampered by the fact that many genera are poorly understood, and the literature references which include Illinois species in their scope are both old and few in number. Many crustose genera are in desperate need of comprehensive revision; indeed many Illinois specimens of *Acarospora, Arthonia, Bacidia, Caloplaca, Graphis, Lecanora. Lecidea. Lepraria. Rinodina, Verrucaria*, and others must remain undetermined for the time being. Identification of the macrolichens is made easier, inasmuch as the genera are fairly well understood, and there is adequate literature covering Illinois species.

This is an annotated checklist of the 98 macrolichens known from Pounds Hollow, in Gallatin County, Illinois. It includes a synopsis of the major macrolichen habitats at Pounds Hollow. Following the checklist is a discussion concerning phytogeographic affinities of the macrolichens. A short glossary is included because some of the lichen terminology is unfamiliar even to most botanists.

Gallatin County is in the extreme southeastern portion of Illinois and lies within the Shawnee Hills Section of the Shawnee Hills Natural Division. This unglaciated hill country is characterized by a high east-west escarpment of sandstone cliffs and their associated

topography (Schwegman, 1973). Pounds Hollow, which includes approximately 1000 acres, lies about 12 miles southeast of the southernmost boundary of the Illinoisan Till Plain; the southern boundary of Pounds Hollow is on the Hardin County line. Parker (1985) has discussed at length the geology, soils, climate, geography, and anthropogenics of the Pounds Hollow area.

Skorepa (1973) reported 25 species from Gallatin County in his lichen flora of southern Illinois. Parker (1985) produced a checklist of the macrolichens of Pounds Hollow in connection with her Master's thesis work on a comprehensive flora of the area. In addition to vascular plants and bryophytes, 77 lichen species were reported. Parker's initial studies at Pounds Hollow revealed that it was uncommonly rich in macrolichen species, even for Southern Illinois. Jackson County, for example, also in the Shawnee Hills Natural Division, has substantial natural areas, but an intensive study of the entire county turned up only 84 macrolichens (Wilhelm & Ladd, 1985); of these, 68 occur at Pounds Hollow.

Pounds Hollow, with the exception of the concession facility, is largely a natural area. Its lichen flora is remarkably conservative and basically weed free. Species such as *Hyperphyscia adglutinata*, *H syncolla*, *Phaeophyscia pusilloides*, *Physconia detersa*, and *Xanthoria fallax*, all so common northward on roadside elms and cottonwoods, are unknown from Pounds Hollow; other weedy species, such as *Phaeophyscia cernohorskyi* and *Xanthoria candelaria*, are locally very rare. Even the briefest of visits to Pounds Hollow leaves one impressed with the lichenose growth festooning all available substrates, so it seemed to us that Pounds Hollow deserved a study which was singularly directed toward the lichens.

MACROLICHEN COMMUNITIES

Most of the lichens at Pounds Hollow occur in two major habitats, open-timbered upland woods along the bluffs, ridges, and ravine slopes; and massive sandstone exposures with their associated sandstone glades and cliff faces. These cliffs often grade into steep slopes to form a succession of rock ledges; these ledges are the result of the lateral grading of massive sandstone into thin-bedded sandstones and shales that cannot maintain a cliff face. Small seepage areas are often found above these ledges. The hollow itself extends over a mile in a northeastward direction from the Pounds Escarpment to the dam. Several ravines enter the hollow from the east and west. About 80 feet below, in the depths of the hollow, is a rich beech-maple forest, which, except for the lichens found on exposed surfaces of fallen sandstone boulders and blocks, is relatively depauperate in macrolichen species.

Upland Woods

The upland woods are characterized by open-grown trees of *Quercus alba, Q. velutina*, and *Q. rubra*, along with *Carya glabra* and *C. ovata*; *Cercis canadensis* and *Cornus florida* are frequent in the understory. Downslope, *Quercus rubra* tends to dominate and is joined by *Acer saccharum*; on xeric sites and on glade margins *Quercus stellata* and *Ulmus alata* are more prominent, along with *Vaccinium arboreum* and *Sassafras albidum*. The ground cover is characterized by low, warm-season grasses, sedges and forbs; outcroppings of sandstone are common, and, in many areas, sandstone is just beneath the soil surface.

The trunks of the trees in the upland woods are richly populated by lichens. Commonly these include: *Candelaria concolor, Collema furfuraceum, Flavoparmelia caperata, Heterodermia speciosa, Leptogium cyanescens, Parmelina aurulenta, Parmotrema hypotropum, P. reticulatum, Phaeophyscia rubropulchra, Physcia millegrana, Punctelia rudecta, Pyxine caesiopruinosa*, and *P. sorediata*. Infrequent to occasional species include: *Canoparmelia caroliniana, C. crozalsiana, Heterodermia obscurata, Leptogium milligranum, Punctelia bolliana*, and *P. subrudecta*. *Catapyrenium tuckermanii* and *Collema conglomeratum* are occasional on the lower trunks of open-grown trees of *Quercus alba* and *Q. stellata*. Upper canopy branches and lower branches of open-grown trees are characterized by *Canoparmelia texana, Hypotrachyna livida, Parmelina aurulenta, P. galbina, Parmotrema michauxianum*, and *Physcia stellaris*.

Sandstone outcrops and cobbles in the upland woods are inhabited regularly by *Cladonia apodocarpa, Flavoparmelia baltimorensis, Parmelina aurulenta, P. minarum, Parmotrema hypotropum, P. reticulatum, Punctelia rudecta, Xanthoparmelia hypopsila*, and *X. somloensis*; less frequently by *Parmelina obsessa, Physcia stellaris, Punctelia semansiana, Pyxine sorediata*, and *Xanthoparmelia subramigera*. On shallow soil over sandstone, *Cladina subtenuis, Cladonia cristatella, C. furcata, C. grayi, Peltigera canina*, and *P. polydactyla* are relatively frequent. Fallen logs and old wood are characterized by *Cladonia bacillaris, C. coniocraea, C. cristatella, C. cylindrica, C. grayi, C. peziziformis*, and *C. polycarpoides*.

Sandstone Glades, Bluff Tops, and Cliffs

The sandstone glades and bluff tops are populated largely by an open growth of *Juniperus virginiana, Quercus marilandica, Q. stellata*, and *Vaccinium arboreum*. Bare sandstone is the prevailing feature. Along with extensive mossy mats of *Grimmia laevigata* and *Hedwigia ciliata*, the following lichens are common: *Cladina rangiferina, C. subtenuis,*

Cladonia apodocarpa, C. caroliniana, C. cristatella, C. furcata, C. grayi, C. squamosa, C. strepsilis, Dermatocarpon miniatum, Flavoparmelia baltimorensis, Xanthoparmelia hypopsila, and *X. somloensis.* In thin soil areas, along with *Agrostis elliottiana, Crotonopsis elliptica, Diodia teres, Plantago pusilla, Sedum pulchellum,* and *Vulpia octoflora,* the following lichens are characteristic: *Cladonia cristatella. C. furcata, C. grayi, C. piedmontensis, C. polycarpoides, C. robbinsii,* and *C. squamosa.* Old cedar stumps provide the habitat for *Cladonia atlantica, C. cristatella, C. grayi,* and *C. squamosa.* Cedar trunks and branches are characterized by *Candelaria concolor, Physcia millegrana, Punctelia perreticulata, P. rudecta, P. subrudecta,* and, more rarely, *Imshaugia aleurites.*

Dry vertical cliff faces are characterized by *Heuchera parviflora, Dryopteris marginalis,* and two crustose lichens: *Lepraria finkii* and *L. lobificans.* The former lichen coats the sandstone walls with leprose mats of yellowish or grayish green; the latter, a white leprose crust, has such well-defined margins that from a distance it resembles a macrolichen. The following macrolichens appear sporadically along the cliff faces: *Canoparmelia texana, Collema flaccidum. Dirinaria frostii. Parmotrema madagascariaceum. P. tinctorum, Ramalina intermedia,* and *Usnea herrei.*

Below the cliffs, shaded, mossy, sandstone blocks and boulders are inhabited by *Anaptychia palmulata, Cladonia coniocraea, C. grayi. Heterodermia speciosa, Leptogium cyanescens, Parmelina aurulenta, P minarum, Parmotrema hypotropum, Phaeophyscia adiastola,* and *P rubropulchra.*

ANNOTATED CHECKLIST

Lichen nomenclature follows Egan (1987). Names used by Skorepa (1973) and Hale (1979), when different from those used here, are given in *italics* type face after the habitat annotation; the initials "H" and "S" after the synonym stand for Hale and Skorepa respectively. Species entries which have voucher specimens on file at the Morton Arboretum Herbarium are rendered in ***boldface italics***. Species entries rendered in *light italics* represent reports made solely by Skorepa (1973), wherein he states specifically that the specimen was collected from Pounds Hollow; he indicates that his voucher specimens are at the University of Tennessee. Specimens are cited by their collector and collection number. The initial "P" stands for Parker. "W" for Wilhelm, and "W&P" for Wilhelm & Parker. Specimens without collection numbers are designated *s.n.* (*sine numero*). and the date of the collection is provided. Lichen substances were determined by thin-layer chromatography, using the methods described by Culberson (1972).

Ninety-one species are represented by collections at The Morton Arboretum. Of the 25 macrolichens that Skorepa reported from Pounds Hollow, six were not seen during our study. Eight macrolichens, now known from Pounds Hollow, were not included in Skorepa's lichen flora of Southern Illinois: *Cladina arbuscula, Cladonia cariosa, Hypotrachyna pustulifera, Phaeophyscia cernohorskyi, Physcia alba. Physciella chloantha, Punctelia perreticulata,* and *Xanthoria candelaria.* Half of these, however, were reported from Southern Illinois [Jackson County] by Wilhelm & Ladd (1985): *Cladonia cariosa, Phaeophyscia cernohorskyi, Physciella chloantha,* and *Xanthoria candelaria.*

ANAPTYCHIA Koerb.

palmulata (Michx.) Vain. Rare; on a shaded, moss-covered sandstone boulder at the base of a bluff in mesic woods. *Anaptychia palmatula* H. P 2274.

CANDELARIA Mass.

concolor (Dicks.) B. Stein Common; on trunks of deciduous trees and cedars throughout. P 2113.

CANOPARMELIA Elix & Hale

caroliniana (Nyl.) Elix & Hale Infrequent; on old growth trees of *Quercus rubra* in dry upland woods. *Parmelia caroliniana* S; *Pseudoparmelia caroliniana* H. P 2263.

crozalsiana (B. de Lesd. ex Harm.) Elix & Hale Occasional; on deciduous trees and cedars in upland woods. *Parmelia crozalsiana* S; *Pseudoparmelia crozalsiana* H. P 2404, 2779; W 14715a.

texana (Tuck.) Elix & Hale Frequent; on twigs, branches, and trunks and on fallen limbs of deciduous trees and cedars nearly throughout; also occasional on shaded sandstone cliff faces. *Parmelia texana* S; *Pseudoparmelia texana* H. P 2218, 2318; W&P 13692, 13711.

CATAPYRENIUM Flot.

tuckermanii (Rav. *ex* Mont.) Thoms. Uncommon; on the lower trunks of open-grown trees of *Quercus alba* and *Q. stellata.* particularly on the edges of high bluffs. *Dermatocarpon tuckermanii* S, H. P 2146. 2181.

CLADINA (Nyl.) Harm.

arbuscula (Wallr.) Hale & Culb. Rare; known locally only from a massive, south-facing sandstone exposure on a cedar glade. W&P 13698.

rangiferina (L.) Nyl. Frequent; on massive sandstone exposures in dry upland woods and glades; often growing with *C. subtenuis. Cladonia furcata, C. robbinsii,* and *C. strepsilis. Cladonia rangiferina* S. P 2583; W&P 13696.

subtenuis (des Abb.) Hale & Culb. Common; on well-leached soil in dry upland woods, often with the lichen *Cladonia furcata*, amidst *Danthonia spicata, Antennaria plantaginifolia, Dicranum scoparium, Leucobryum glaucum*, and *Bryoandersonia illecebra*; also with other fruticose lichens on massive sandstone exposures on glades. *Cladonia subtenuis* S. P 2195, 2207, 2210, 2309.

CLADONIA Hill *ex* Browne

apodocarpa Robb. Occasional; on massive sandstone exposures in glades and on sandstone outcrops in dry upland woods. P 2776; W&P 13719.

atlantica A. Evans Occasional; our two specimens were collected from a dry cedar limb and a stump on a sandstone glade west of Pounds Lake. It is difficult to know just how frequent it really is since, morphologically, it is identical to *C. squamosa*, from which it can be distinguished only by chromatography; note that we have six specimens of *C. squamosa*. P 2323; W&P 13725.

bacillaris Nyl. Occasional to common; on decorticate logs in dry upland woods. P 2128, 2163.

cariosa (Ach.) Spreng. Evidently rare; our specimen, which consists of squamules only, was collected on thin soil over sandstone. P 2189.

caroliniana Schwein. *ex* Tuck. Frequent to common; on massive sandstone exposures and glades. P 2203, 2211, 2221; W 8732.

chlorophaea (Flk. *ex* Somm.) Spreng. Evidently rare; most of the sorediate cup lichens are referable to *C. grayi*, which see; our only specimen of this species was growing on a cedar stump in a glade west of Pounds Lake. W&P 13730.

coniocraea *auct. fide* Ahti Occasional; on shaded sandstone ledges and decorticate logs in dry upland woods. Some of our material is referable to what Skorepa calls *C. ochrochlora* Flk. P 2217; W 11958, 14703.

cristatella Tuck. Common; on a wide variety of substrates, particularly on glades and in dry upland woods; we have specimens from thin soil over sandstone, on soil around clumps of *Andropogon scoparius*, among other lichens and mosses on stumps and soil, fallen cedar limbs, and on massive sandstone exposures. Specimens with usnic acid: P 2171, 2177, 2179, 2180, 2208; W&P 13723; W 8724; specimen without usnic acid: W&P 13726.

cryptochlorophaea Asah. Evidently rare, this chemical segregate of *C. chlorophaea* is known locally only from among mosses at the base of *Quercus stellata* in dry upland woods. In addition to cryptochlorophaeic acid, it contains fumarprotocetraric acid and atranorin. W&P 13679.

cylindrica (A. Evans) A. Evans Occasional; on corticate and decorticate fallen logs in dry upland woods, often with (

coniocraea and *C. cristatella*. P 2216; W 14713.

didyma (Fee) Vain. Rare; known locally only from a decorticate log at the north end of the recreation area in the region just east of the dam. W 14714.

furcata (Huds.) Schrad. Common; on shaded soil among mosses in dry upland woods; also on thin soil over massive sandstone exposures on glades. P 2205, 2206, 2220, 2325.

grayi G. K. Merr. *ex* Sandst. Common; on thin soil over sandstone in dry upland woods, on massive exposed sandstone on glades, cedar and oak stumps, and shaded decorticate logs. This species, clearly the common element locally, was subsumed under *C. chlorophaea* by Skorepa (1973). Specimens with fumarprotocetraric acid: W&P 13739; W 14701, 14707; specimens without fumarprotocetraric acid: P 2187, 2215; W&P 13691, 13717, 13718, 13720, 13722, 13735.

peziziformis (With.) Laund. Uncommon; along paths and on old dry wood. *Cladonia capitata* H, S. P 2164.

piedmontensis G. K. Merr. Infrequent; on thin soil over sandstone outcrops in dry upland woods and on massive sandstone exposures. P 2158.

pleurota (Flk.) Schaer. Rare; known locally only from a massive sandstone exposure on a glade west of Pounds Lake. W&P 13721.

polycarpoides Nyl. Common; on exposed massive sandstone on glades, on moist shaded soil, and on logs and stumps in dry upland woods. *Cladonia subcariosa* S. P 2191; W&P 13716; W 11956, 14718a.

pyxidata (L.) Hoffm. Rare; known locally only from a shaded sandstone boulder on the bluff east of the dam. W 14705.

robbinsii A. Evans Occasional; on moist thin soil around seeps on massive sandstone exposures on bluff tops and glades. P 2183, 2222.

sobolescens (Nyl.) Vain. Rare; the population from which our specimen was taken grows with *C. piedmontensis* on sandstone cobbles in dry upland woods. *Cladonia clavulifera* H, S. P 2172.

squamosa (Scop.) Hoffm. Frequent; on massive sandstone exposures on bluff tops and on glades, and among mosses over thin soil in seep areas; also on old cedar stumps and limbs. P 2310; W&P 13724, 13740; W 11955, 14700, 14704.

strepsilis (Ach.) Vain. Occasional; this species forms tight, hemispherical mounds of small to medium-sized squamules in exposed or partly shaded areas on massive sandstone exposures; podetia are rarely found. P 2311; W 11957.

uncialis (L.) Weber *ex* Wigg. Rare; known locally only from a massive sandstone exposure on a glade west of Pounds Lake. W&P 13697.

COCCOCARPIA Pers.

palmicola (Spreng.) Arvidss. & D. Galloway Rare; known locally only from a couple of dead cedar stumps in dry upland woods. *Coccocarpia cronia* H, S. P 2278, 2590.

COLLEMA Wigg.

conglomeratum Hoffm. Uncommon; on lower trunks of open-grown trees of *Quercus alba* and *Q. stellata* on glades and in dry upland woods, often associated with *Catapyrenium tuckermanii.* P 2587.

flaccidum (Ach.) Ach. Infrequent; on shaded, moist, sandstone cliff faces and boulders. P 2167, *s.n.* 6 Jul 1984.

furfuraceum (Arn.) Du Rietz Frequent; at the bases of hickories, old growth oaks, and cedars on glades and in dry upland woods. P 2585, 2592, 2594a; W&P 13677, 13680a.

DERMATOCARPON Eschw.

luridum (With.) Laund. According to Skorepa (1973), this species is "common on shaded sandstone, sandstone in creek beds, and sandstone on dry bluff tops. When it is on bluff tops, it usually is in seepage areas." He separates it from *D. miniatum* on the basis of morphology and the fact that the latter remains brown or gray when wet. We have not seen specimens of what we believe to be this species, but taxonomic distinctions between this and *D. miniatum* are unclear in local populations. *Dermatocarpon fluviatile* H, S. Skorepa 4839.

miniatum (L.) Mann Common; on bare sandstone or in seepage areas over sandstone in dry upland woods, massive sandstone exposures, and creek beds. P 2108; W 8723.

DIRINARIA (Tuck.) Clem.

frostii (Tuck.) Hale & Culb. Uncommon; on dry, sheltered, vertical sandstone walls along the south-facing bluff of Rim Rock Trail. P 2405.

FLAVOPARMELIA Hale

baltimorensis (Gyeln. & Foriss) Hale Common; on sandstone cobbles and outcrops in dry upland woods and on glades. *Parmelia caperata* S. in part; *Pseudoparmelia baltimorensis* H. P 2175; W&P 13733, 13737.

caperata (L.) Hale Very common; on trunks and branches of deciduous trees and cedars throughout the area. *Parmelia caperata* S. in part; *Pseudoparmelia caperata* H. P 2200, 2212.

HETERODERMIA Trev.

granulifera (Ach.) Culb. Uncommon; on open-grown trees of *Quercus stellata* and *Q. alba* on bluff tops and on glades. P 2188.

obscurata (Nyl.) Trev. Infrequent; on oaks and hickories in dry upland woods. P 2173, 2196; W 8739.

speciosa (Wulf.) Trev. Common; at the bases of oaks in dry upland woods and on glades; also among mosses over fallen trunks and on sandstone. *Heterodermia tremulans* S. P 2317, 2584.

HYPOTRACHYNA (Vain.) Hale

livida (Tayl.) Hale Common; on canopy branches of oaks and hickories in dry upland woods; also on branches of old growth cedars and *Vaccinium arboreum*. *Parmelia livida* S. P 2199.

pustulifera (Hale) Skorepa Rare; though he never reported it, this species was first collected in Illinois by Skorepa in November, 1967 on cedar at Pounds Hollow; it was not collected again until 1984 when it was noted by the junior author, again on cedar. Insofar as we can determine, these are the only two specimens known from Illinois. These specimens from Pounds Hollow were reported as new to Illinois by McKnight *et al.* (1987). P 2597; Skorepa 3987 (Southern Illinois University Herbarium, this specimen was determined by Skorepa as *Parmelia aurulenta*).

IMSHAUGIA S. F. Meyer

aleurites (Ach.) S. F. Meyer Rare; known locally only from dead standing cedar trunks along Rim Rock Trail and on a glade west of Pounds Lake. *Parmeliopsis aleurites* H, S. P 2182, 2588.

LEPTOGIUM (Ach.) Gray

austroamericanum (Malme) Dodge Occasional; at the bases of oaks and hickories in dry upland woods and on glades. P 2407.

corticola (Tayl.) Tuck. Rare; our only specimen is from the base of a cedar near the beginning of Rim Rock Trail. P *s.n.* 11 Feb 1984.

cyanescens (Rabenh.) Koerb. Common; on exposed shaded roots and lower trunks of deciduous trees and cedars, moist to dry shaded sandstone outcrops, and sandstone creek beds. P 2255, 2406, 2780, *s.n.* 6 Jul 1984.

milligranum Sierk Frequent; at the bases of oaks and hickories in dry upland woods and on glades. We have a specimen (W&P 13685) from sandstone which resembles *L. milligranum*, but the lobe surfaces are smooth as in *L. cyanescens*; it may be referable to *L. chloromelum* (Ach.) Nyl. as it is described by Hale (1979), though not by Sierk (1964). P 2586, 2594; W&P 13680.

LOBARIA Schreb.

quercizans Michx. Skorepa (1973) first reported this species for Illinois from Pounds Hollow and Lusk Creek Canyon; he listed the substrates as *Quercus alba* and *Ulmus alata*. Skorepa (1977) published it new to Illinois. Skorepa 6098.

PARMELINA Hale

aurulenta (Tuck.) Hale Common; on a variety of substrates.

including shaded sandstone cobbles and outcrops, trunks and branches of deciduous trees and cedars in dry upland woods and glades. *Parmelia aurulenta* S. P 2267, 2306, 2308, 2321.

galbina (Ach.) Hale Occasional, though often undetected in the upper branches of canopy trees in dry upland woods; also on *Ulmus alata* and *Vaccinium arboreum* on glades and bluff tops. *Parmelia galbina* S. P 2275.

minarum (Vain.) Skorepa Common; though known from elsewhere in the region on bark, all of our records are from shaded sandstone, usually among mosses, in dry upland woods and on cliff faces. *Parmelia dissecta* S; *Parmelina dissecta* H. P 2169, 2260, 2316, 2320, 2322; W&P 13703, 13734.

obsessa (Ach.) Hale Rare; known locally only from a shaded sandstone boulder in dry upland woods. *Parmelia obsessa* S. W&P 13704.

PARMOTREMA Mass.

austrosinense (Zahlbr.) Hale Rare; known locally only from cedar twig at the edge of the bluff along Rim Rock Trail; perhaps more frequent than our records indicate. *Parmelia austrosinensis* S. P 2596.

cetratum (Ach.) Hale Listed by Skorepa (1973) as uncommon on oaks and hickories on dry bluff tops. *Parmelia cetrata* S. Skorepa 4864.

crinitum (Ach.) M. Choisy Listed by Skorepa (1973) as rare on trees in dry woods; his Pounds Hollow specimen is the only Southern Illinois specimen reported. *Parmelia crinita* S. Skorepa 4705.

eurysacum (Hue) Hale Rare; known locally only from the trunk of an oak in dry upland woods along Rim Rock Trail. *Parmelia eurysaca* S. P 2257.

hypotropum (Nyl.) Hale Common; on a variety of substrates, particularly the trunks and branches of deciduous trees and cedars, but also on shaded sandstone boulders and outcrops in dry upland woods. *Parmelia hypotropa* S. P 2261, 2402, 2411, *s.n.* 25 Jun 1984.

madagascariaceum (Hue) Hale Rare regionally; locally frequent on the vertical sandstone walls along the west and southwest faces of the Pounds Escarpment. *Parmelia madagascariacea* S. P 2410; W 14706.

michauxianum (Zahlbr.) Hale Occasional; on canopy branches of trees in dry upland woods and on the branches of *Ulmus alata*, *Vaccinium arboreum*, and *Quercus stellata* on glades and bluff tops. *Parmelia michauxiana* S. P 2254.

reticulatum (Tayl.) M. Choisy Common; usually on the trunks and branches of deciduous trees and cedars, but occasionally on

shaded sandstone cobbles and outcrops in dry upland woods. *Parmelia reticulata* S. P 2219, 2256, 2781.

submichauxianum Hale *in ed.* Skorepa (1973) reported this recently described species from Pounds Hollow under the name *Parmelia dilatata* Vain., to which it keys in his dissertation. The latter is a southeastern species with a shinier upper cortex and broader lobes, but the chemistry is the same as *Parmotrema submichauxianum*. With the exception of the soredia, this species is identical to *Parmotrema michauxianum*. It is known also from the Missouri Ozarks and the Appalachian Mountains.

tinctorum (Delise *ex* Nyl.) Hale Uncommon regionally, this species is locally frequent with *P. madagascariaceum*, which see. *Parmelia tinctorum* S. P 2409.

PELTIGERA Willd.

canina (L.) Willd. Frequent: on shaded moist banks and mossy slopes; also among mosses and other lichens on well-leached soils in dry upland woods, at the bases of old growth oaks, and on shaded mossy sandstone outcrops. P 2176, 2197.

polydactyla (Neck.) Hoffm. Infrequent; on substrates similar to *P. canina*, but nowhere near as common. One of the duplicates of the cited voucher specimen has an apothecium oriented horizontally--as in *Peltigera horizontalis* (Huds.) Baumg.; apothecia in the other specimen are oriented lengthwise. P 2131.

PHAEOPHYSCIA Moberg

adiastola (Essl.) Essl. Common; prevailingly among mosses over shaded sandstone, less often on lower trunks of cedars and oaks in dry upland woods in glades; also among mosses on fallen logs. *Physcia orbicularis* S, in part. P 2159, 2170, 2315, 2324, 2595.

cernohorskyi (Nadv.) Essl. Rare; known locally only from an old-growth cedar near a large sandstone outcrop northeast of Pounds Lake. P 2314.

imbricata (Vain.) Essl. Occasional; at the bases of oaks and hickories in dry upland woods. *Physcia lacinulata* S. P 2326.

rubropulchra (Degel.) Moberg Common; characteristic of lower trunks and exposed roots of deciduous trees and cedars in moist to dry woods, less often among mosses over shaded sandstone; this is one of the more shade-tolerant lichens of Pounds Hollow. *Physcia orbicularis* S, in part. P 2124.

PHYSCIA (Schreb.) Michx.

aipolia (Ehrh. *ex* Humb.) Fuernr. This species is known from Pounds Hollow solely on the basis of the report by Skorepa (1973), in which he indicates that it is rare in the region and occurs on trees in open areas. Skorepa 6067.

alba (Fee) Muell. Arg. Rare; known locally only from a small fallen

limb along Rim Rock Trail in upland woods; perhaps it is occasional on upper canopy branches. P 2185.

americana G. K. Merr. *in* Evans & Meyrow. Frequent; on deciduous trees and cedars in dry upland woods and on glades. *Physcia tribacoides* S. P 2186, 2190, 2591.

millegrana Degel. Common; on deciduous trees and cedars throughout Pounds Hollow. P 2209.

stellaris (L.) Nyl. Common; prevailingly on deciduous trees and cedars throughout Pounds Hollow; less often on dry sandstone boulders. P 2192, 2598, 2593, 2598.

subtilis Degel. Rare; known locally only from a large sandstone boulder on the east side of Pounds Lake. P 2273.

PHYSCIELLA Essl.

chloantha (Ach.) Essl. This species, weedy in Illinois northward, is known from Pounds Hollow only on the sandstone retaining wall near the concession facility. *Physcia chloantha* H. W&P 13686.

PUNCTELIA Krog

bolliana (Muell. Arg.) Krog Occasional; on the lower trunks of oaks and cedars in dry upland woods and on glades. *Parmelia bolliana* H, S. P 2269.

perreticulata (Ras.) Wilhelm & Ladd Frequent; on old-growth cedars on bluff tops and on glades. *Parmelia perreticulata* H. P 2130, 2160, 2170, 2204.

rudecta (Ach.) Krog Common; on a variety of substrates, prevailingly on the trunks and branches of deciduous trees and cedars in dry upland woods and glades, but also on shaded sandstone boulders and outcrops. *Parmelia rudecta* H, S. P 2178, 2201, 2258.

semansiana (Culb. & C. Culb.) Krog Uncommon; on shaded sandstone boulders in upland woods. *Parmelia hypoleucites* H, S. P 2264.

subrudecta (Nyl.) Krog Frequent; on substrates similar to *P. rudecta*, though nowhere near as common. *Parmelia subrudecta* H, S. P 2161, 2198, 2327.

PYXINE Fr.

caesiopruinosa (Nyl.) Imsh. Common; on a wide variety of deciduous trees and cedars in dry upland woods and on glades. P 2168.

sorediata (Ach.) Mont. Frequent; on a wide variety of deciduous trees and cedars in dry upland woods and on glades; less often on shaded sandstone boulders and outcrops. P 2162, 2307.

RAMALINA Ach.

intermedia (Delise *ex* Nyl.) Nyl. Rare; known locally only on a dry.

sheltered, sandstone boulder near the base of a north-facing, vertical wall along the lower trail. P 2408.

TUCKERMANNOPSIS Gyeln.

viridis (Schwein. *in* Halsey) Hale Rare; known only from the branches of *Quercus stellata* on a sandstone glade west of Pounds Lake. *Cetraria viridis* H, S. W&P 13678.

USNEA Dill. *ex* Adans.

herrei *sensu* Hale Frequent; on dry sandstone boulders in upland woods and dry vertical cliff faces. According to Egan (1987), *U. herrei* is a *nomen nudum.* Whatever the name, our specimens all have soredia, white medullae, bases concolorous with the branches, and are saxicolous. P 2266 has usnic acid only; P 2165, 2319, W&P 13706, W 14699 all have usnic acid along with norstictic and galbinic acids.

strigosa (Ach.) A. Eaton Rare; known locally only from a dead sassafras tree in the pine plantation near the Lake Road entrance. Our specimen has usnic acid only. P 2403.

XANTHOPARMELIA (Vain.) Hale This genus is very difficult to interpret without access to thin-layer chromatography. Medullar substances and lower thallus color are critical in making determinations. We have included taxonomic notes to facilitate determinations of Pounds Hollow specimens.

conspersa (Ehrh. *ex* Ach.) Hale Infrequent; on massive sandstone exposures, outcrops, and boulders. This is the only isidiate *Xanthoparmelia* with a black lower surface at Pounds Hollow; its medulla reacts K+ persistent yellow. *Parmelia conspersa* S. P 2271.

cumberlandia (Gyeln.) Hale Occasional; on massive sandstone exposures, outcrops, and boulders. This species is similar to *X. hypopsila*, but it has a prevailingly brown lower surface; its medulla reacts K+ persistent yellow. *Parmelia cumberlandia* S. W&P 13715.

hypomelaena (Hale) Hale Occasional; on massive sandstone exposures, outcrops, and boulders. This is the only non-isidiate species at Pounds Hollow with a K- medullary reaction. *Parmelia hypomelaena* S. W&P 13701.

hypopsila (Muell. Arg.) Hale Common; on massive sandstone exposures, outcrops, and boulders. This species has a black lower surface and no isidia; its medulla reacts K+ persistent yellow. *Parmelia hypopsila* S. P 2262, 2276; W&P 13714; W 14696.

somloensis (Gyeln.) Hale Common; on massive sandstone exposures, outcrops, and boulders. This species is similar to *X. hypopsila*, but it has a largely brown lower surface, and its medulla reacts K+ yellow turning red. *Xanthoparmelia taractica* H; *Parmelia*

taractica S. P 2270; W&P 13699, 13710; W 14708.

subramigera (Gyeln.) Hale Frequent; on massive sandstone exposures, outcrops, and boulders. This is the only isidiate species at Pounds Hollow with K− (or K+ brownish) medullary reactions. *Parmelia subramigera* S. P 2272; W 14695.

tasmanica (J. D. Hook. & Tayl.) Hale Uncommon; on massive sandstone exposures, outcrops, and boulders. This species is similar to *X. somloensis*, but its lower surface is black everywhere except the margins. *Parmelia tasmanica* S. P 2268.

XANTHORIA (Fr.) Th. Fr.

candelaria (L.) Th. Fr. This species is virtually a weed northward in the till plain of Illinois, but at Pounds Hollow it is known only from a small population on a single tree of *Carya texana* located near the parking area at the concession facility. W&P 13684.

EXCLUDED SPECIES

Seven species of macrolichens have been reported from Pounds Hollow, but examination of the specimens upon which they were based has led us to refer them to other species. Their exclusion here does not mean necessarily that they are absent from Pounds Hollow, only that there are no other specimens or literature reports to support their presence.

Acarospora chlorophana. Parker (1985). The specimen upon which this report is based (P 2277) is better referred to the closely related *A. schleicheri* (Ach.) Mass. The latter is a manifestly crustose species with an essentially areolate thallus. *A. chlorophana* is very similar, but can be considered a macrolichen because the thallus margins are notably effigurate with branched lobes. It is probably at Pounds Hollow.

Cladonia ramulosa. Parker (1985). This species was reported under the name *C. pityrea.* The voucher specimen (P 2216) contains grayanic acid and is referable to *C. cylindrica.*

Cladonia polycarpia. Parker (1985). This species, common in the Deep South, contains atranorin, stictic acid, and norstictic acid; authentic material still is unknown from Illinois. The specimen (P 2189) upon which this report is based contains only atranorin and is therefore referable to *C. cariosa, which see.* Both species have K+ persistent yellow cortical reactions, so chromatographic methods are necessary for identification.

Hypotrachyna formosana. Parker (1985). The specimens (P 2597; Skorepa 3987) upon which this report is based are referable to *H.*

pustulifera. The upper cortex of the latter contains atranorin (K+ yellow) and lacks lichexanthone. All of the pustular-isidiate *Hypotrachynae,* in The Morton Arboretum Herbarium, from Southern Illinois and the Missouri Ozarks are referable to *H. pustulifera*; all of the specimens which have lichexanthone (UV+ bright orange) in the cortex and lack atranorin are from the Deep South.

Parmotrema dilatatum. Skorepa (1973). See the comments under *P. submichauxianum.*

Parmotrema xanthinum. Parker (1985). All of the southern Illinois material contains gyrophoric acid in the medulla, a character which identifies *P. madagascariaceum,* which see.

Xanthoparmelia plittii. Parker (1985). The specimen (P 2272); upon which this report is based is referable to *X. subramigera.*

PHYTOGEOGRAPHIC AFFINITIES

Not surprisingly, the macrolichen flora of Pounds Hollow has a close affinity to the lichen flora of the eastern and southeastern United States. The great tall grass prairie of Illinois' till plain long has provided a physiographic barrier between the northern forests and the timbered lands of the lower Midwest. Consequently, the boreal element is small, and probably its presence at Pounds Hollow is by way of the Appalachians. The absence of exposed limestone and the preponderance of sandstone severely limit the extent to which the saxicolous flora can have any affinity to the Ozarks; nevertheless, there are significant numbers of Ozark and Appalachian elements in the flora.

There is no satisfactory way in which to place many species within a defined phytogeographic province. The inability to utilize names and distributions from older literature, paucity of distribution data, and the fact that some species do not adhere to such provinces, combine to frustrate most attempts to assign species to provincial categories. The following phytogeographic groupings are essentially those used by Skorepa (1973); distribution is based largely on that same reference and on Hale (1979).

Pan-Eastern United States: *Anaptychia palmulata, Catapyrenium tuckermanii, Cladina subtenuis, Cladonia caroliniana, C. cristatella. C. cylindrica, C. didyma, C. peziziformis. C. piedmontensis. C. polycarpoides, C. robbinsii, C. sobolescens. C. squamosa, C. strepsilis. Flavoparmelia baltimorensis. F. caperata, Heterodermia speciosa. Hypotrachyna livida, Leptogium corticola, Parmelina aurulenta, P. galbina, Parmotrema reticulatum. Phaeophyscia adiastola. P. cernohorskyi, P. imbricata. P. rubropulchra, Physcia americana. P. mille-*

grana, Physciella chloantha, Punctelia bolliana, P. semansiana, Pyxine soredíata, Usnea strigosa, Xanthoparmelia hypopsila, and *X. tasmanica* (35 species).

Southeastern United States: *Canoparmelia caroliniana, C. texana. Coccocarpia palmicola, Heterodermia obscurata, Leptogium austroamericanum, Parmotrema austrosinense, P. cetratum. P. crinitum, P. hypotropum, P. madagascariaceum. P. michauxianum. P. tinctorum. Physcia alba,* and *Pyxine caesiopruinosa* (14 species).

Wide-spread in North America: *Cladina rangiferina, Cladonia chlorophaea, C. coniocraea, C. furcata, C. grayi, Dermatocarpon luridum, D. miniatum, Peltigera canina, P. polydactyla, Punctelia subrudecta, Xanthoparmelia conspersa,* and *X. cumberlandia* (12 species).

Ozark/Appalachian: *Canoparmelia crozalsiana, Cladonia apodocarpa. Dirinaria frostii, Heterodermia granulifera, Hypotrachyna pustulifera. Parmelina minarum, P. obsessa, Parmotrema submichauxianum. Tuckermannopsis viridis,* and *Usnea herrei* (10 species).

Pan-Temperate United States: *Candelaria concolor. Cladonia bacillaris, C. cryptochlorophaea, Collema furfuraceum, Leptogium milligranum, Physcia aipolia, P. stellaris, Xanthoparmelia somloensis.* and *Xanthoria candelaria* (9 species).

Eastern United States and Western Mountains: *Cladonia cariosa. Collema conglomeratum, Imshaugia aleurites, Leptogium cyanescens. Physcia subtilis,* and *Punctelia rudecta* (6 species).

Boreal North America: *Cladina arbuscula. Cladonia pleurota, C. pyxidata, C. uncialis,* and *Collema flaccidum* (5 species).

Ozark/South Central: *Parmotrema eurysacum, Punctelia perreticulata,* and *Xanthoparmelia subramigera* (3 species).

Appalachian Mountains/Great Lakes: *Lobaria quercizans. Ramalina intermedia,* and *Xanthoparmelia hypomelaena* (3 species).

Coastal Plain: *Cladonia atlantica* (1 species).

GLOSSARY

Apothecium (a): ascocarp; the usually disc- or cup-shaped "fruiting body."
Areolate: pertaining to the thallus or cortical surfaces which break up into discrete units or patches.
Concolorous: the same color.
Cortex: a smooth skin or surface, with respect to lichens; bark, with respect to trees.

Corticate: with a cortex.
Decorticate: having sloughed or shed a cortex.
Ecorticate: without a cortex.
Effigurate: with a definite form, usually implying lobed margins.
Esorediate: without soredia.
Foliose: pertaining to a strongly dorsiventrally flattened lichen thallus, which thallus is usually adnate to its substrate and consists of a medulla and an upper cortex.
Fruticose: pertaining to a lichen whose morphology is such that the thallus stands elevated from its substrate, attached usually at only one point.
Gelatinous: pertaining to lichen thalli which are notably gelatin-like upon soaking and which contain cyanobacteria (blue-green algae) as their "algal" host.
Isidia: small, usually narrowly cylindrical, corticate projections on the upper lichen surface.
Isidiate: with isidia.
Leprose: pertaining to a thallus which is composed of unconsolidated or loosely organized, ecorticate granules.
Lobes: flat, usually discrete projections of a foliose thallus.
Medulla (ae): the inner mass of loosely woven fungal hyphae, usually overlaid by cortical tissue.
Podetium (a): the club-shaped or cup-shaped portion of a *Cladonia* thallus.
Pustular: pertaining to open or incipiently open blisters or warts on the upper surface of certain lichen thalli.
Rhizines: hair-like strands of hyphae on the lower surfaces of certain lichen thalli.
Saxicolous: inhabiting rock or rock-like substrates.
Sorediate: with soredia.
Soredium (a): a somewhat unorganized, ecorticate unit of hyphae and algae which extrudes from or appears on the surface of the cortex or exposed medulla. It is a curious artifact of the terminology that this term is nearly never used in the singular.
Squamule (s): small, scale-like portion of a thallus, typically without a lower cortex and rhizines.
Squamulose: with squamules.
Umbilicate: pertaining to dorsiventrally flattened lichen thalli which are attached to the substrate at a single point, as if by an umbilicus.

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The Vascular Flora of Langham Island Kankakee County , Illinois

by John E. Schwegman

Langham Island is located in the Kankakee River at the village of Altorf, five miles northwest of Kankakee, Illinois. This 24 acre island has long been noted for the variety of rare and unusual plants inhabiting it. Chief among these is the Kankakee Mallow (*Iliamna remota*) which is native only to this island. Although visited be botanists since 1872, no complete vascular flora list has been compiled for the area. This paper presents such a list.

Historically, the first written record I have found of the island was made by a government land surveyor on April 7, 1834. He described it as a "beautiful timbered island that does not overflow" and called it Langham's Island (Page 98, volume 356 PLS field notes). At this time the south shore of the river was "high level rich prairie" and the north shore was timbered. Tree species listed for the area are "burr oak, white oak, and hickory".

In 1834 the north shore of the river, to which the island is closest, was part of a large timbered grove which contained a major Potawatomi indian village. Several tracts in this grove (Rock Grove) were deeded to the indians by the Treaty of Tippecanoe. A large tract just east of the island was granted to an indian named Joseph Laughton, son of Wais-Ke-Shaw. Since histories of the county list no Langhams among the earliest settlers, it appears that the island was named for this indian and that the surveyor and the authors of the treaty spelled his name differently. The indians were forced to cede their lands and move to Iowa in 1836 (Beckwith, 1884).

Land near the island was settled rapidly following the departure of the indians. A dam was built between the island and the north shore. The village of Altorf was settled at this time. The mill deteriorated before 1890, but the end of the dam and an apparent borrow area are still evident on the island.

E.J. Hill began visiting the island and collecting the unusual plants he found there in 1872. He does not describe the conditions on the island at that time, but describes some of his visits in his letters found in Kibbe (1953). He discribes the habitat for most of his collections as "gravelly island", "dry banks" and "gravelly bank of island". By 1912, and continuing at least until 1916, Sherff (1946) noted that the more elevated flat portion of the island was cleared and cultivated as a corn field. He described the remaining woodland as "open woods" and "rocky grassy slopes". When Sherff returned in 1945 the field had been abandoned. Since that time the island has remained undisturbed and the field has succeeded to a brushy and small tree stage.

Langham Island became part of Kankakee River State Park in the early 1940s, and was dedicated as an Illinois Nature Preserve in 1966. Management of the

Island to benefit the Kankakee Mallow, under a recovery plan for that species (Schwegman 1984), began in 1983, began in 1983. Management has included prescribed fire and chemical control of exotic shrubs.

Langham Island consisted only of a flat-topped 13 acre bedrock upland when first surveyed and platted in 1868. Since that time, an 11 acre low alluvial area has accreted to the southeastern (upstream) end. The island is located at the upstream end of the "gorge" of the Kankakee River at a point where the river is swift, shallow and rocky. It is nearest the northern shore.

The present study area consists of this entire 24 acre island and the aquatic habitats immediately bordering it. The natural communities present in the study area include dry upland forest on the southwest slopes, mesic upland forest on the northeast slopes floodplain forest, late successional old field, bedrock outcrops, river banks, swift river and quiet river. The river bank community is impacted frequently by ice flow scouring as well as flooding.

The island is 2,300 feet long and a maximum of 640 feet wide. Its linear dimension tends southeast to northwest. The river elevation is apporximately 560 feet above sea level, while the old field interior of the island is at elevation 580 feet. The highest elevation is 581 feet. The northeast side of the island has more gentle 4 to 7 percent slopes than the 18 to 30 precent slopes of the southwest side.

Soils of the flat upland are Rockton Loam which is developed in 20 to 36 inches of stratified sands and silts over dolomite bedrock. The northeast slopes are Ritchey Loam which is 10 to 24 inches thick on bedrock while the steeper southwest slopes contain Sogn Loam. Sogn has less than 10 inches of loamy material over bedrock. This soil is gravelly with some very large cobbles in some areas. Two areas of bedrock outcrop also occur on the southwest slopes. The lower southwest end of the island has medium textured alluvium on lower areas while the higher elevations contain Onarga Fine Sandy Loam.

Dominant plants of the late succession stage old field are Canada bluegrass (*Poa compressa*), white sweet clover (*Melilotus alba*) and goldenrod (*Solidago canadensis*). Slippery elm (*Ulmus rubra*) and hawthorn (*Crataegus crus-galli*) are the principal invaders of the field along with the introduced shrub Amur honeysuckle (*Lonicera maackii*). Mesic forests on the northeast slope are of red oak (*Quercus rubra*) with an understory of bladdernut (*Staphylea trifolia*). The drier forests of the south slope are of burr oak (*Quercus macrocarpa*) and blue ash (*Fraxinus pennsylvanica*), hackberry (*Celtis occidentalis*) and American elm (*Ulmus americana*). Cottonwood (*Populus deltoides*) is a common tree along the north shore. Swift water areas support sago pondweed (*Potamogeton pectinatus*) and eelgrass (*Vallisneria americana*) while quiet waters are usually dominated by water weed (*Elodea canadensis*) and curly pondweed (*Potamogeton crispus*). Common shoreline herbs are water willow (*Justicia americana*) and rose mallow (*Hibiscus laevis*).

Among the more notable plants known from Langham Island is the Kankakee mallow which was first collected there by E. J. Hill on June 29, 1872. It remains abundant there today and, so far as is known, is native only to this island. The corn salads (*Valerianella intermedia* and *V. unbilicata*) are annuals occupying the banks and interior fields. While the latter species was abundant during this study, the former was last collected by Swink on July 2, 1966 (SIU). The leafy prairie clover (*Dalea foliosa*) was first discovered on the island

on August 27, 1872 by E. J. Hill. He found it growing on "gravelly banks". Realizing he had discovered a little known species, he returned July 28, 1873 to collect more. In a letter to Harry Patterson dated November 29, 1873, Hill, referring to the leafy prairie clover, writes "In fact I found but five plants after thorough search. Four of these I dug up, sending two of the roots to Dr. (Asa) Gray, to cultivate, fearing I might exterminate; the other was left". This species has not been seen on the island since. Seeds of the leafy prairie clover from Will County Illinois were sowed along the south banks of the island in 1986 in hopes of reestablishing a population there. Buffalo clover (*Trifolium reflexum*) was collected on the island June 13, 1884 (ILL) and the violet (*Viola viarum*) was also collected here May 16, 1884 (ILL), both by Hill. Neither was found during the present study.

Among the unexpected species I encountered were Scutellaria nervosa, a single specimen of which was found on a dry ledge on the south slopes. This species was later found to be locally common on the nearby north shores of the river. A few *Viola missouriensis* were found in low woods near the south end of the island and a single *Lysimachia terrestris* was found on the north shore. *Carex hitchcockiana* and *Allium burdickii* were found in a bit of mesic forest near the old dam.

The following annotated checklist includes 315 taxa and was compiled during the 1985 growing season. It also includes a few taxa observed in 1986 and several species collected by others in prior years but apparently now extinct on the island. The taxonomy follows Mohlenbrock (1986) as to species and family names and family sequence. The Genera and Species are alphabetically arranged within the families. Species preceeded by an asterisk (*) are alien species.

(Editor's Note: According to the author, the species list which follows was compiled mostly of site identifications only. More unusual species were collected and are housed in the herbarium at the Illinois State Museum.)

Equisetaceae

Equisetum arvense L. Common Horsetail. Local along north shore.
Equisetum hyemale L. Scouring Rush. Local on moist shores.

Ophioglossaceae

Botrychium virginianum (L.) Sw. Rattlesnake Fern. Local in mesic forest.

Aplleniaceae

Asplenium platyneuron (L.) Oakes Ebony Spleenwort. Rare in upland forest.

Potamogetonaceae

**Potamogeton crispus* L. Curly Pondweed. Common in quiet water along north shore.
Potamogeton nodosus Poir. Pondweed. Local along north shore.
Potamogeton pectinatus L. Sago Pondweed. Common in swift and quiet water.

Hydrocharitaceae

Elodea canadensis Michx. Waterweed. Common in quiet water.
Vallisneria americana Michx. Eelgrass. Common in swift and quiet water.

Poaceae

Andropogon gerardii Vitman Big Bluestem. Rare on south slope.
**Agrostis alba* L. Redtop. Local on moist south shore.
**Bromus inermis* Leyss. Smooth Brome. Local on dry open south slopes.
Cinna arundinacea L. Stout Wood Reed. Local in upland woods.
Echinochloa crus-galli (L.) Beauv. Barnyard Grass. Rare on south shore.
Elymus villosus Muhl. Slender Wild Rye. Common on forested slopes.
Elymus virginicus L. Virginia Wild Rye. Local in woods.
Eragrostis frankii A. Meyer Lovegrass. Local on moist open river banks.
Eragrostis hypnoides (Lam) BSP Pony Grass. Local on moist sandy shores.
**Eragrostis pilosa* (L.) Beauv. Love Grass. Common on moist shores on north side.
**Festuca pratensis* Huds. Tall Fescue. Rare on open south slope.
Festuca obtusa Bieler Nodding Fescue. Common in mesic forest.
Leersia virginica Willd. White Grass. Local in alluvial forest.
Muhlenbergia bushii Pohl Muhly. Local in alluvial forest.
Muhlenbergia frondosa (Poir.) Fern. Muhly. Local in moist forest.
Muhlenbergia schreberi J.F. Gmel. Nimble Will. Rare in forest.
Panicum capillare L. Witch Grass. Local on open banks.
Panicum dichotomiflorum Michx. Fall Panicum. Local on moist shores.
Panicum virgatum L. Switchgrass. rare on the open south bank.
Phalaris arundinacea L. Reed Canary Grass. Common along shores.
Poa compressa L. Canada Bluegrass. Common in interior old field.
Poa sylvestris Gray Woodland Bluegrass. Common in mesic forest.
**Setaria faberi* Herrm. Giant Foxtail. Rare on open south slopes.
**Setaria lutescens* (Weigel) Hubb Yellow Foxtail. Rare in interior fields.
Spartina pectinata Lind. Cordgrass. Local on moist south banks.
Spenopholis obtusata (Michx.) Scribn. Wedge Grass. Local in woods.

Cyperaceae

Carex blanda Dewey Woodland Sedge. Common in woods.
Carex cephalophora Muhl. Sedge. Local on dry slopes.
Carex davisii Schwein. & Torr. Sedge. Local on south slopes.
Carex gravida Bailey Sedge. Local in upland woods.
Carex hitchcockiana Dewey Hitchcock's Sedge. Local in woods at old dam site.
Carex jamesii Schwein. James's Sedge. Rare in mesic forest.
Carex normalis Mack. Sedge. Local in old field.
Carex pensylvanica Lam. Penn Sedge. Local on dry open south slope.
Carex sparganioides Muhl. Sedge. Rare in woods.
Carex stricta Lam. Clumped Sedge. Rare along south shore.
Carex vulpinoidea Michx. Fox Sedge. Local along south shore.
Cyperus aristatus Rottb. Galingale. Rare along north shore.
Cyperus erythrorhizos Muhl. Galingale. Common on north shore.
Eleocharis elliptica Kunth Spike Rush. Local along north shore.
Scirpus americanus Pers. Three-square Bulrush. Local on shore near north end.
Scirpus micranthus Vahl Small Bulrush. Rare along north shore.

Araceae

Arisaema dracontium (L.) Schott Green Dragon. Local in alluvial woods.

Lemnaceae

Lemna minor L. Common Duckweed. Local in quiet water around island.

Commelinaceae

Tradescantia ohiensis Raf. Ohio Spiderwort. Local in fields.

Liliaceae

Allium burdickii (Hanes) A.G. Jones Wild Leek. Rare in woods by old mill dam.
Allium canadense L. Wild Onion. Common in woods.
Allium cernuum Roth Nodding Onion. Local in old field and on dry slopes.
**Asparagus officinalis* L. Asparagus. Local in woods and on banks.
Camassia scilloides (Raf.) Cory Wild Hyacinth. Common on south slopes.
**Hemerocallis fulva* L. Day Lily. Rare along north shore.
Polygonatum commutatum (Schult.) A. Dietr. Solomon's Seal. Local in woods.
Smilacina stellata (L.) Desf. False Solomon's Seal. Reported by Payton in 1973.
Trillium recurvatum Beck Wake Robin. Local in dry woods on south slope.
Trillium sessile L. Sessile Wake Robin. Common in mesic and moist woods.

Smilacaceae

Smilax ecirrhata (Engelm.) S. Wats. Carrion Flower. Local in woods.
Smilax lasioneuron Hook. Carrion Flower. Local in woods.
Smilax hispida Muhl. Bristly Greenbriar. Local in mesic woods.

Dioscoreaceae

Dioscorea villosa L. Wild Yam. One large population in dry woods.

Iridaceae

**Belamcanda chinensis* (L.) DC. Blackberry Lily. Rare on south slope.
**Iris x germanica* L. Bearded Iris. One population in old field.
Iris shrevei Small Wild Blue Iris. Local along shore.

Salicaceae

Populus deltoides Marsh. Cottonwood. Local along north shore.
Salix exigua Nutt. Sandbar Willow. Rare on south banks.

Juglandaceae

Carya cordiformis (Wang.) K. Koch Bitternut Hickory. Rare in woods.
Carya ovata (Mill.) K. Koch Shagbark Hickory. Rare in woods.
Juglans nigra L. Black Walnut. Local in low woods.

Fagaceae

Quercus alba L. White Oak. Local in woods.
Quercus bicolor Willd. Swamp White Oak. Local in low woods.
Quercus macrocarpa Michx. Burr Oak. Common on south side.
Quercus prinoides Willd. Yellow Chestnut Oak. Local on south side.
Quercus rubra L. Northern Red Oak. Local in woods.

Ulmaceae

Celtis occidentalis L. Hackberry. Local in low woods.
Ulmus americanus L. American Elm. Local along north shore.
Ulmus rubra Muhl. Slippery Elm. Local in upland woods and fields.

Urticaceae

Boehmeria cylindrica (L.) Sw. False Nettle. Local in moist soil.
Laportea canadensis (L.) Wedd. Stinging Nettle. Rare on moist banks.
Parietaria pensylvanica Muhl. Pellitory. Rare in woods.
Pilea pumila (L.) Gray Clearweed. Local along north shore.
Urtica dioica L. Stinging Nettle. Local along north shore.

Aristolochiaceae

Asarum canadense L. Wild Ginger. Common in mesic woods.

Polygonaceae

Polygonum amphibium L. Water smartweed. Rare along north shore.
**Polygonum aviculare* L. Knotweed. Local on dry south banks.
Polygonum lapathifolium L. Nodding Smartweed. Local along north shore.
Polygonum pensylvanicum L. Common Smartweed. Local on shores.
**Polygonum persicaria* L. Lady's Thumb. Local on north shore.
Polygonum punctatum Ell. Smartweed. Local on north shore.
Polygonum scandens L. False Buckwheat. Local in woods and on open banks.
Rumex crispus L. Curly Dock. Local on river banks.
Rumex verticillatus L. Water Dock. Local along shore.

Chenopodiaceae

Chenopodium album L. Lamb's Quarters. Local in fields and on banks.
Chenopodium gigantospermum. Aellen Maple-leaved Goosefoot. Rare on dry banks.
Chenopodium standleyanum Aellen Goosefoot. Common in woods.

Amaranthaceae

Amaranthus rudis Saver Water Hemp. Local on moist shores.

Nyctaginaceae

**Mirabilis nyctaginea* (Michx) MacM. Wild Four-o'clock. Local on dry banks.

Portulacaceae

Claytonia virginica L. Spring Beauty. Local in woods.

Caryophyllaceae

Cerastium arvense L. Field Mouse-eared Chickweed. Local on dry south bank.
Silene antirrhina L. Sleepy Catchfly. Rare on an uprooted stump.
**Silene cucbalus* Wibel Bladder Catchfly. Rare on dry south banks.
Silene stellata (L.) Ait. f. Starry Campion. Local in dry woods.

Ceratophyllaceae

Ceratophyllum demersum L. Coontail. Local in quiet water around island.

Ranunculaceae

Anemone virginiana L. Tall Anemone. Local in woods and on banks.
Clematis pitcheri Torr. & Gray Leatherflower. Common on dry open banks.
Ranunculus abortivus L. Small-flowered Crowfoot. Local in all communities.
Ranunculus micranthus Nutt. Small-flowered Buttercup. Local in woods.
Ranunculus septentrionalis Poir. Swamp Buttercup. Local in moist areas.
Thalictrum revolutum DC. Waxy Meadow Rue. Local in moist woods.

Berberidaceae

**Berberis vulgaris* L. Common barberry. Rare on south slopes.
Podophyllum peltatum L. Mayapple. Rare near old mill site.

Menispermaceae

Menispermum canadense L. Canada Moonseed. Rare on moist banks.

Papaveraceae

Corydalis micrantha (Engelm.) Gray Slender Corydalis. Rare on dry south banks.
Dicentra cucullaria (L.) Bernh. Dutchman's Breeches. Common in north slope woods.

Brassicaceae

Arabis laevigata (Muhl.) Poir. Smooth Rock Cress. Local in woods.
Arabis shortii (Fern.) Gl. Rock Cress. Common in low areas all around the island.
**Brassica nigra* (L.) Koch Black Mustard. Common on dry open banks.
Dentaria laciniata Muhl. Toothwort. Common in slope woods.
Descurainia pinnata (Walt.) Britt. Tansy Mustard. Rare on limestone ledges.
Iodanthus pinnatifidus (Michx.) Steud. Purple Rocket. Local in low woods.
**Lepidium campestre* (L.) R.Br. Field Peppergrass. Local on river banks.
**Lepidium densiflorum* Schrad. Peppergrass. Local on dry south slopes.
**Rorippa sylvestris* (L.) Bess. Creeping Yellow Cress. Common on river banks.

Crassulaceae

**Sedum sarmentosum* Bunge Yellow Stonecrop. Rare on rocks on south bank.
Sedum ternatum Michx. Three-leaved Stonecrop. Very local on south banks.

Grossulariaceae

Ribes missouriense Nutt. Missouri Gooseberry. Common in all communities.

Rosaceae

Agrimonia parviflora Ait. Agrimony. Local in level upland woods.
Agrimonia pubescens Wallr. Soft Agrimony. Local in upland woods.
Crataegus crus-galli L. Cock-Spur Thorn. Local in fields and woods.
Crataegus mollis (Torr. & Gray) Scheele Red Haw. Common in alluvial forest.
Geum canadense Jacq. White Avens. Common in woods.
Geum laciniatum Murr. Rough Avens. Rare on moist shores.
Geum vernum (Raf.) Torr & Gray Spring Avens. Local in alluvial woods.
Malus ioensis (Wood) Britt. Iowa Crabapple. Local in fields and woods.
**Potentilla recta* L. Sulphur Cinquefoil. Rare in old field.
Prunus americana Marsh. Wild Plum. Local on dry south banks.
Prunus serotina Ehrh. Wild Black Cherry. Local in fields and woods.
Prunus virginiana L. Choke Cherry. Common in upland woods.
Rosa carolina L. Pasture Rose. Local on dry south banks.
**Rosa multiflora* Thunb. Multiflora Rose. Common in woods and fields.
Rosa setigera Michx. Prairie Rose. Rare in successional forest.
Rosa suffulta Greene Sunshine Rose. Rare on dry south banks.
Rubus occidentalis L. Blackberry. Local in fields and woods.

Mimosaceae

Desmanthus illinoensis (Michx.) MacM. Illinois Mimosa. Local on dry banks.

Caesalpinaceae

Cassia marilandica L. Maryland Senna. Local on south slopes.
Cercis canadensis L. Redbud. Common in fields and woods.

Gleditsia triacanthos L. Honey Locust. Rare in woods and fields.

Fabaceae

Amorpha fruticosa L. False Indigo. Local along shores.
Amphicarpa bracteata (L.) Fern. Hog Peanut. Local in moist woods.
Apios americana Medic. Ground Nut. Rare on moist north banks.
Dalea foliosa (Gray) Barneby Leafy Prairie Clover. Formerly on dry banks, reintroduced in 1987.
**Medicago lupulina* L. Black Medic. Rare on dry south banks.
Trifolium reflexum L. Buffalo Clover. Formerly in dry open woods.

Oxalidaceae

Oxalis dillenii Jacq. Yellow Wood Sorrel. Local on dry banks.
Oxalis stricta L. Yellow Wood Sorrel. Local on dry banks.

Rutaceae

Ptelea trifoliata L. Wafer Ash. Local along north bank.
Xanthoxylum americanum Mill. Prickly Ash. Local in woods.

Simaroubaceae

**Ailanthus altissima* (Mill.) Swingle Tree-of-heaven. Local in field.

Euphorbiaceae

Acalypha rhomboidea Raf. Three-seeded Mercury. Local on moist shores.
Acalypha virginica L. Three-seeded Mercury. Local on river banks.
Chamaesyce humistrata (Engelm.) Small Milk Spurge. Local on dry banks.
Chamaesyce maculata (L.) Small Nodding Spurge. Local on dry banks.
Poinsettia dentata (Michx.) Kl. & Garcke Wild Poinsettia. Dry gravel around burned logs.

Limnanthaceae

Floerkea proserpinacoides Willd. Flase Mermaid. Common in low and mesic woods.

Anacardiaceae

Rhus glabra L. Smooth Sumac. Local in fields.
Toxicodendron radicans (L.) Kuntze Poison ivy. Common in woods.

Staphyleaceae

Staphylea trifolia L. Bladdernut. Common in north slope woods.

Aceraceae

Acer negundo L. Box Elder. Local in low alluvial woods.
Acer saccharinum L. Silver Maple. Local along shore at north end.

Rhamnaceae

**Rhamnus cathartica* L. Common Buckthorn. Rare in open woods.

Vitaceae

Parthenocissus quinquefolia (L.) Planch. Virginia Creeper. Local in slope woods.
Vitis riparia Michx. Riverbank Grape. Local in low woods.

Tiliaceae

Tilia americana L. Basswood. Local along upper south banks.

Malvaceae

Hibiscus laevis All. Halberd-leaved Rose Mallow. Local along shores.
Iliamna remota Greene Kankakee Mallow. Local in dry woods and fields on south side.

Hypericaceae

Hypericum sphaerocarpum Michx. Round-fruited St. John's Wort. Common on open south banks.

Violaceae

Viola missouriensis Greene Missouri Violet. Rare in low woods.
Viola pratincola Greene Smooth Violet. Loca in afforested upland.
Viola pubescens Ait. Downy Yellow Violet. Local in wet woods.
Viola sororia Willd. Wooly Blue Violet. Local in mesic woods.
Viola viarum Pollard Violet. Collected from dry banks in 1884.

Elaeagnaceae

Elaeagnus umbellata Thunb. Autumn Olive. Rare in open field.

Lythraceae

**Lythrum salicaria* L. Purple Loosestrife. Rare as seedlings along north shore.

Onagraceae

Ludwigia palustris (L.) Ell. Marsh Purselane. Local on moist shores.
Oenothera biennis L. Biennial Evening Primrose. Local on dry banks.

Apiaceae

Chaerophyllum procumbens Wild Chervil. Local in woods.
Cryptotaenia canadensis (L.) DC. Honewort. Local in moist woods.
**Daucus carota* L. Queen Anne's Lace. Local in fields.
Osmorhiza longistylis (Torr.) DC. Anise-root. Local in moist to mesic woods.
Perideridia americana (Nutt.) Reichenb. Common on dry south slopes.
Sanicula canadensis L. Canadian Black Snakeroot. Common in moist woods.
Sanicula gregaria Bickn. Common Snakeroot. Local in mesic woods.
**Torilis japonica* (Houtt.) DC. Hedge Parsley. Local in fields.
Zizia aurea (L.) Koch Golden Alexanders. Local along south banks.

Cornaceae

Cornus racemosa Lam. Gray Dogwood. Common in woods by old dam.
Cornus stolonifera Michx. Red Osier Dogwood. Local on river banks.

Primulaceae

Androsace occidentalis Pursh Rare in open sandy old field.
Lysimachia ciliata L. Fringed Loosestrife. Rare along the north bank.
**Lysimachia nummularia* L. Moneywort. Local in moist woods.
Lysimachia terrestris (L.) BSP. Swamp Candles. Rare (one plant) along north shore.

Oleaceae

Fraxinus pennsylvanica Marsh. Green Ash. Local in woods and fields.
Fraxinus quadrangulata Michx. Blue Ash. Local on south slopes.

Apocynaceae

Apocynum cannabinum L. Dogbane. Local in fields.
**Vinca minor* L. Periwinkle. Rare in woods near old dam.

Asclepiadaceae

Asclepias incarnata L. Swamp Milkweed. Local along shores.
Asclepias syriaca L. Common Milkweed. Rare on low open shore.

Convolvulaceae

Calystegia sepium (L.) R. Br. American Bindweed. Common on low north banks.
Ipomoea pandurata (L.) G.F.W. Mey. Wild Sweet Potato. Local on north banks.

Polemoniaceae

Phlox divaricata L. Wild Sweet William. Local in woods.

Hydrophyllaceae

Ellisia nyctelea L. Aunt Lucy. Local on dry wooded slopes.
Hydrophyllum appendiculatum Michx. Great Waterleaf. Local in mesic woods.
Hydrophyllum virginianum L. Virginia Waterleaf. Local in slope forest.

Boraginaceae

**Cynoglossum officinale* L. Hounds Tongue. Rare in field.
Mertensia virginica (L.) Pers. Virginia Bluebells. Rare in low woods at west end.
Onosmodium hispidissimum Mack. Marbleseed. Rare at east end of field.

Verbenaceae

Phyla lanceolata (Michx) Greene Frog Fruit. Common on moist shores.
Verbena hastata L. Blue Vervain. Local on moist banks.

Verbena simplex Lehm. Narrow-leaved Vervain. Rare on dry rocky banks.
Verbena urticifolia L. White Vervain. Local on dry banks.

Lamiaceae

Agastache nepetoides (L.) Ktze. Yellow Giant Hyssop. Local on banks and in woods.
**Glechoma hederacea* L. Ground Ivy. Local in low moist woods.
**Leonurus cardiaca* L. Motherwort. Local in fields.
Lycopus americanus Muhl. Common Water Horehound. Rare on banks at west end.
**Mentha x piperita* L. Peppermint. Rare on south bank.
Monarda fistulosa L. Bee Balm. Local in fields and on dry banks.
Physostegia speciosa (Sweet) Sweet False Dragonhead. Rare on north banks.
Scutellaria lateriflora L. Mad Dog Skullcap. Local along south bank.
Scutellaria nervosa Pursh Veiny Skullcap. Rare (one plant) on limestone outcrop.
Stachys tenuifolia Willd. Smooth Hedge Nettle. Local slong moist north banks.
Teucrium canadense L. American Germander. Local on dry banks and in woods.

Solanaceae

Physalis heterophylla Nees. Ground Cherry. Rare on south banks.
Solanum carolinense L. Horse-nettle. Local on dry banks.
**Solanum dulcamara* L. Bittersweet Nightshade. Rare near shore at west end.
Solanum ptycanthum Dunal Black Nightshade. Local on banks.

Scrophulariaceae

Agalinis tenuifolia (Vahl) Raf. Slender False Foxglove. Common along shores.
Dasistoma macrophylla (Nutt.) Raf. Mullein Foxglove. Common in fields.
Leucospora multifida (Michx.) Nutt. Rare on sandy banks.
Mimulus ringens L. Monkey-flower. Local on moist banks.
Penstemon digitalis Nutt. Foxglove Beardstongue. Common on banks and in woods.
Scrophularia marilandica L. Late Figwort. Local on dry banks.
**Verbascum thapsus* L. Wooly Mullein. Local in fields and on slopes.

Acanthaceae

Justicia americana (L.) Vahl Water Willow. Common in shallow water along shores.
Ruellia strepens L. Smooth Wild Petunia. Local in woods.
Ruellia humilis Nutt. Wild Petunia. Local on dry banks.

Plantaginaceae

**Plantago major* L. Common plantain. Local in disturbed areas.
Plantago rugelii Dcne. Rugel's Plantain. Local on dry banks.

Rubiaceae

Cephalanthus occidentalis L. Buttonbush. Rare along south shore.
Galium aparine L. Goose Grass. Common in woods.

Galium circaezans Michx. Bedstraw. Local in woods.

Caprifoliaceae

**Lonicere maackii* Maxim. Amur Honeysuckle. Common throughout island.
Lonicera prolifera (Kirchn.) Rehder Grape Honeysuckle. Local on south slopes.
**Lonicera tatarica* L. Tatarian Honeysuckle. Local in fields and woods.
Symphoricarpos orbiculatus Moench. Coralberry. Rare at edge of field.
Viburnum prunifolium L. Black Haw. Local in woods.

Valerianaceae

Valerianella intermedia Dyal Corn Salad. Rare, last collected in 1966.
Valerianella umbilicata (Sulliv.) Wood Corn Salad. Common in fields and on dry banks.

Campanulaceae

Lobelia cardinalis L. Cardinal Flower. Rare on north shore.
Lobelia siphilitica L. Great Blue Lobelia. Local along shores.
Triodanis perfoliata (L.) Nieuwl. Venus's Looking Glass. Rare in disturbed field.

Asteraceae

Achillea millefolium L. Yarrow. Local in the field.
Ambrosia artemisiifolia L. Common Ragweed. Common in disturbed sites.
Ambrosia trifida L. Giant Ragweed. Rare in moist soil at south end.
Artemisia biennis Willd. Biennial Wormwood. Rare on dry south bank.
Aster drummondi Lindl. Drummond's Aster. Rare in mesic forest.
Aster novae-angliae L. New England Aster. Rare on dry south banks.
Aster ontarionis Wieg. Ontario Aster. Local in alluvial and upland woods.
Aster pilosus Willd. Hairy Aster. Local on dry banks on south side.
Aster shortii Lindl. Short's Aster. Common in dry woods on south side.
Aster vimineus Lam. Aster. Local on north side.
Bidens bipinnata L. Spanish needles. Rare in upland woods.
Bidens cernua L. Nodding Bur Marigold. Common along shores.
Bidens connata Muhl. Swamp Beggar-ticks. Local along shores.
Bidens frondosa L. Common Beggar-ticks. Common on north shore.
Bidens vulgata Greene Tall Beggar-ticks. Rare on south banks.
Brickellia *eupatorioides* (L.) Shinners False Boneset. Local in field.
Cirsium arvense (L.) Scop. Canada Thistle. Rare on dry banks.
Cirsium discolor (Muhl.) Spreng. Field Thistle. Local in field.
Conyza canadensis (L.) Cronq. Muletail. Rare on dry banks.
Eclipta prostrata (L.) L. Yerba de Tajo. Rare along south shore.
Erigeron annuus (L.) Pers. Daisy Fleabane. Local in fields.
Erigeron philadelphicus L. Marsh Fleabane. Local on moist banks.
Erigeron strigosus Muhl. Daisy Fleabane. Local in dry fields and banks.
Eupatorium altissimum L. Tall Boneset. Local in old field.
Eupatorium maculatum L. Spotted Joe-pye-weed. Local on moist banks.
Eupatorium rugosum Houtt. White Snakeroot. Common in woods.
Eupatorium serotinum Michx. Late Boneset. Local on dry south banks.
Helenium autumnale L. Autumn Sneezewood. Local along moist banks.
Helianthus divaricatus L. Woodland Sunflower. Rare in dry woods.

Helianthus strumosus L. Pale-leaved Sunflower. Rare on dry banks.
Heliopsis helianthoides (L.) Sweet False Sunflower. Local on dry open south banks.
Lactuca floridana (L.) Gaertn. Wild Blue Lettuce. Common in mesic woods.
**Lactuca serriola* L. Prickly Lettuce. Local in field.
Prenanthes crepidinea Michx. Great White Lettuce. Rare on south wooded slope.
Ratibida pinnata (Vent.) Barnh. Gray Coneflower. Local in field and on south banks.
Rudbeckia laciniata L. Golden Glow. Common in moist woods.
Senecio aureus L. Golden Ragwort. Rare in old field.
Silphium perfoliatum L. Cup Plant. Local on north banks.
Solidago canadensis L. Tall Goldenrod. Local on dry banks and in field.
Solidago gigantea Ait. Late Goldenrod. Local in moist woods.
**Sonchus asper* (L.) Hill Spiny Sow Thistle. Local on south banks.
**Taraxacum officinale* Weber Dandelion. Local in disturbed sites.
**Tragopogon dubius* Scop. Goat's Beard. Local on south bank.
Verbesina alternifolia (L.) Britt. Yellow Ironweed. Common in alluvial forest.
Verbesina helianthoides Michx. Yellow Crownbeard. Local on south banks.
Vernonia gigantea (Walt.) Trel. Tall Ironweed. Local in moist ground.
Vernonia missurica Raf. Missouri Ironweed. Local in field and on south bank.
Xanthium strumarium L. Cocklebur. Local on river banks.

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John E. Schwegman is a native of Metropolis, Illinois and holds a MA degree in Botany from SIU Carbondale. His professional interests have included natural areas preservation, natural community management and endangered plant species conservation. He continues to pursue his interest in floristics by producing flora lists for selected natural areas. As Botany Program Manager for the Illinois Department of Conservation, he is also coordinating the state's Ginseng conservation program and the Department's prairie restoration effort.

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